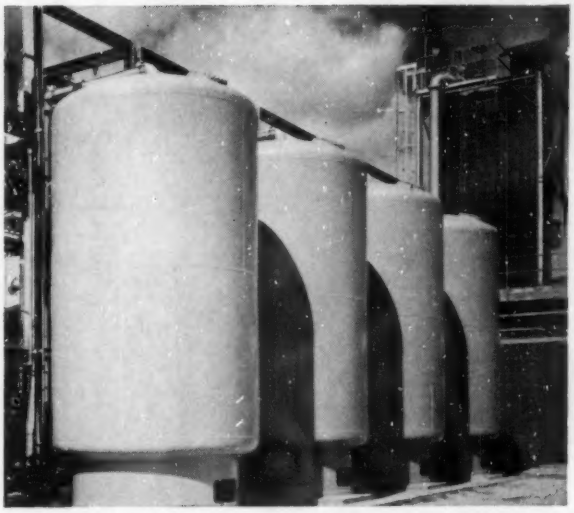
PUBLIC WORKS

Feb. 1957

CITY, COUNTY AND STATE

ENGINEERING. Permutit engineers work with your staff or your consulting engineers to design all or any part of your water conditioning system.



EQUIPMENT. Permutit supplies complete equipment. Critical parts such as valves, chemical feeders and controls are designed and made by Permutit.

How Permutit® Solves a Water Problem

Growing U. S. cities and towns are faced with using lower-grade water. Results: increased hardness, turbidity, iron, high CO_2 "aggressive waters", other problems . . . complaints from homeowners, businesses, industries.

• **For expert answers** more and more waterworks officials and their consultants are buying the complete service offered by leading water-conditioning firms. Here's how Permutit (rhymes with "compute it"), a pioneer and largest in the field, tackles a water problem:

• **Water analysis,** study of the problem and past experience provide data on possible methods of treatment. The process offering the best balance of initial and operating cost vs. desired quality of treated water is selected.

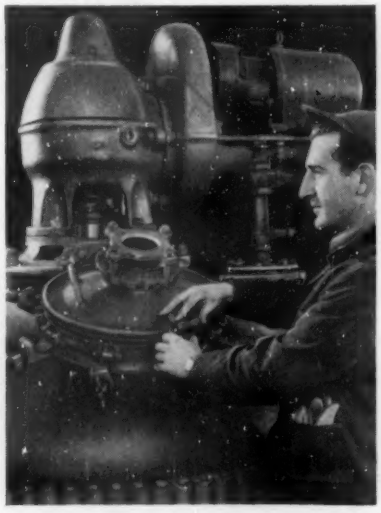
• **Complete proposal** by Permutit engineers covers type, size and capacity of equipment, price, any special engineering services and performance guarantees.

• **Manufacturing** -- After the proposal is accepted, Permutit designs the entire project, schedules assembly and shipping. Critical parts, ion exchange resins, control panels are all made in Permutit plants. (No other U. S. firm makes all these components.)

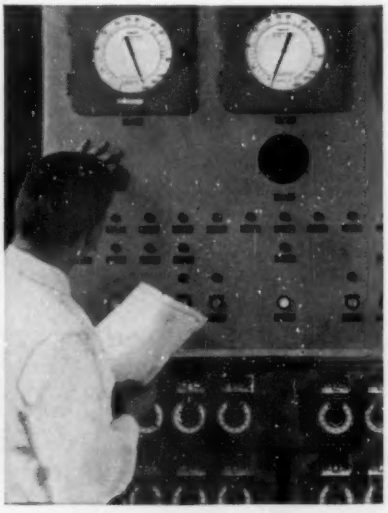
• **Test runs** – Where required, Permutit checks the installation, supervises start-up and initial operation, trains permanent operating personnel.

• **For further information** look up the Permutit office in your city or write to The Permutit Company, Dept. **PW**-2. 330 West 42nd St., New York 36, N. Y.

WATER ANALYSIS. Permutit's modern water-analysis laboratory tests over 1200 samples a month!



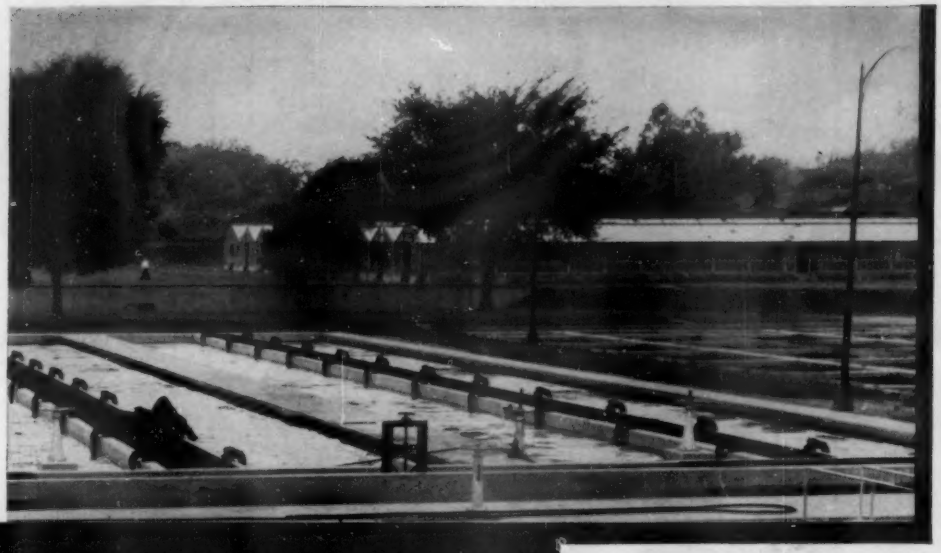
ION EXCHANGE RESINS. Permutit makes its own ion exchange resins, natural and synthetic zeolites.



AUTOMATIC CONTROLS to ensure optimum results are designed, assembled, wired and tested by Permutit.

"from Chicago"

the aeration story



FINE BUBBLES +

WIDE BAND AERATION +

SWING DIFFUSERS =

maximum oxygenation efficiency for high treatment at low cost

Since their installation at the Lima, Ohio Sewage Treatment Plant shown above, Chicago Pump Company Swing Diffusers and Precision Tubes have operated for over a year with no problems whatsoever. Plant records show excellent results in high grade effluent for the aeration tanks with Chicago Pump Company equipment. From January through May, 1956 this plant handled an average of 8 M.G.D. using an average of 0.498 cubic feet of air per gallon of sewage.

Fine bubbles, provided by Chicago Pump Company Precision Diffusion Tubes, give far greater contact of air and sewage (for equivalent air volumes) due to increased bubble surface, and result in maximum oxygenation absorption.

Wide Band Aeration, through Chicago Pump Company Swing Diffusers, produces a wide mass of finely divided bubbles completely circulating through the entire tank contents, increasing contact efficiency while eliminating center "coring".

Swing Diffusers for wide band aeration provide flexible economical operation, continuous performance and easy accessibility. Individual units are easily raised for service without de-watering the tank.

fmc

CHICAGO PUMP COMPANY

Subsidiary of Food Machinery and Chemical Corporation

SEWAGE EQUIPMENT DIVISION

622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Flush Kleen ®, Screw-Feller ®, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers, Swing Diffusers, Stationary Diffusers, Mechanical Aerators Combination Aerator-Clarifiers, Barminutor ® Comminutors.

always specify "Chicago"

"ALWAYS READY TO GO TO WORK"

—clearing trees, pulling stumps, loading earth...and saving money

The scene: the City of Opelika in Alabama. The project: another street being prepared for paving by the Department of Public Works. The machine: a Caterpillar No. 955 Traxcavator*. "We believe this is the best all-around utility machine a city can own," says Supt. N. L. McCrory. "We've used it as a stump puller, a 'dozer, and an earth loader. It's easily moved from one location to another. And it's always ready to go to work."

Always ready, because the Traxcavator is *tough—built for the hard work.* Its frame is made of heavy steel, welded into a one-piece unit and mounted so the track roller frames take all the loads and stresses. The powerful lift arms and cross braces are of box section construction, and bucket tilt arms are solid steel, an inch and a half thick.

That bucket, by the way, gets a full load on every pass—1½ cu. yd. of paydirt—and adjusts quickly to an almost unlimited range of working positions.

But let your Caterpillar Dealer demonstrate for you why the Cat-built Traxcavator is "the best all-around utility machine a city can own." Watch that 70-flywheel-HP CAT* Diesel Engine in action. See how smooth and fast-acting the No. 955's hydraulic controls are—how easy to operate, how accurate. And whether it's digging, backfilling, loading, leveling, disposing of refuse, stockpiling, or handling any of the other hard-work chores you give it, here's a machine that's "always ready to go to work." Expensive down time is cut to a minimum with the No. 955: a truly budget-saving investment.

Your dealer is ready also with expert service, and parts you can trust. Call him soon.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

PUBLIC WORKS MAGAZINE

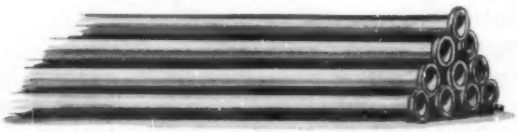
CONTENTS

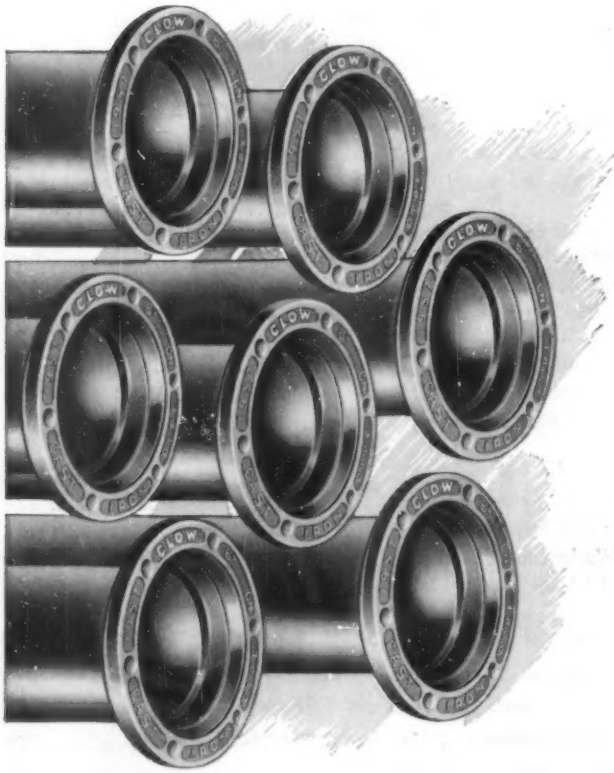
FEBRUARY, 1957 **Vol. 88, No. 2**

PUBLIC WORKS DIGESTS

DEPARTMENTS AND SECTIONS

take advantage of the plus factors when you specify UNDERGROUND WATER PIPE





Experienced men who specify and install underground water pipe take advantage of the plus factors when they specify cast iron pipe.

Take the pressure plus factor. Minimum wall thickness Clow cast iron pipe (ASA A21.6 Class 22) is rated for at least 250 psi working pressure in diameters 10″ and smaller.

What does this mean? It means that cast iron pipe is rated safely above the minimum pressure requirements for municipal water service, and can be specified to the full ASA rated working pressure. This is because of the inherent strength of cast iron pipe . . . beam strength . . . compressive strength . . . bursting strength . . . all scientifically calculated with ample factor of safety on the basis of sound engineering practice and the result of actual service records.

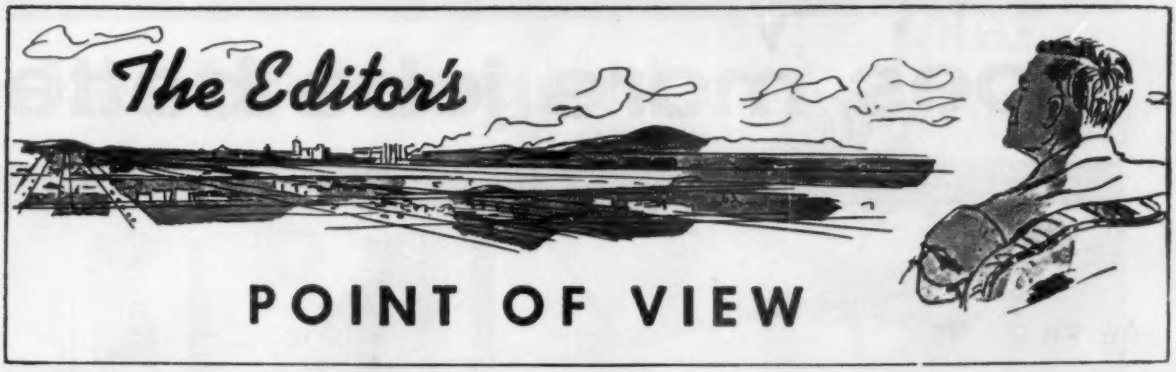
To get the best advantage of the plus factors for your system, invite a Clow man in to discuss your requirements when pipe first enters your plans.

JAMES B. CLOW & SONS, Inc.

201-299 N. Talman Avenue • Chicago 80, Illinois

Subsidiaries: Eddy Valve Company, Waterford, New York • Iowa Valve Company, Oskaloosa, Iowa

SINCE 1878



A Professional Corps of Engineers for the Military Services

EVERYONE interested in engineering and in fair play to engineers should read the article with this title in the November issue of the *American Engineer*. For the first time, so far as your editor knows, the facts of the military engineering situation are presented fully. The impossibility of granting professional (or bonus) pay to engineers, on any fair and workable basis, under present conditions, is made clear.

It will no doubt come as a shock to many to know that only about half of the Corps of Engineer officers are college graduates, a proportion that has remained fairly constant since the close of World War II; and probably a much smaller proportion are registered engineers, even today.

The time is far past when engineers should start to create a truly professional status. This will take courage and persistence and it will be a highly thankless task, despite its great need.

Who Is Responsible for Water Shortages?

THIS PAST summer, Indianapolis dedicated its new impounding reservoir to H. S. Morse, Chairman of the Board of Directors of the Indianapolis Water Co. The accomplishment for which he was cited was keeping pace with community demands for water in spite of unprecedented increase in those demands. We echo the words of the Chamber of Commerce President in his tribute speech to say this is not happenstance, but the result of foresight and ingenuity of a character equal to the occasion. Taking nothing from the accomplishment of Mr. Morse, it occurs to us that something is wrong with government when it fails consistently to meet the demands of the community. Surveys have shown that in many or most areas, water shortages are largely man-made and are not always from lack of water. They are man-made because the facilities and techniques of getting water to the tap have not kept up with the population growth and the growing demands of the steadily increasing standard of living. In a recent survey conducted by PUBLIC WORKS, it was shown that consulting engineers and water works engineers are fully aware of the demand factors. The lack of awareness or ultra-conservatism—a nicer name for it—must be found then, in the functioning of a government which, though responsive to the desires of the governed, is not necessarily responsive to the needs of the governed. Are we falling down in our attempts to alert responsible officials and the public? The results of the PUBLIC WORKS survey are in article form; among the more interesting findings is that the old rule-of-thumb, 100 gallons per capita, has long been outmoded for most cities. Some real thinking should be stimulated on how to avert future crises; perhaps our survey will be of help.

Pooling Engineers Can Have Serious Disadvantages

A CENTRAL POOL of engineers to serve all city departments has been recommended for Akron, O. This plan has much to commend it, but it contains one most serious defect. This is the implication that public health engineers be included in the pool. There is a great backlog of experience to show that responsibility for health measures must be placed on an independent agency with potential powers greater than those of any department head. It is perhaps not often that these powers need to be exercised; but there are times when it is vitally necessary. Moreover, there must be someone charged with maintaining that constant watch over such health hazards as may occur in any city—hazards to the quality of the water, hazards in the handling or disposal of refuse, hazards in poor drainage, for instance. A pool of engineers may be fine, but no city should forget that its prime responsibility is the welfare of its citizens, their health and comfort, and not in the saving of money.

River Beds Might Be Used for High Speed Motor Roads in Cities

IN MANY CITIES, space for much needed high speed motor roads is at a premium. Some of these cities have rivers flowing through them. It is possible that these rivers could provide much-needed areas for new roads. Rights-of-way problems would be solved easily. The cost of building the flood-proof supports for the roadway and raising it above high water levels often would not exceed right-of-way costs. If flood levels are quite well known, suitable design should not prove too difficult.

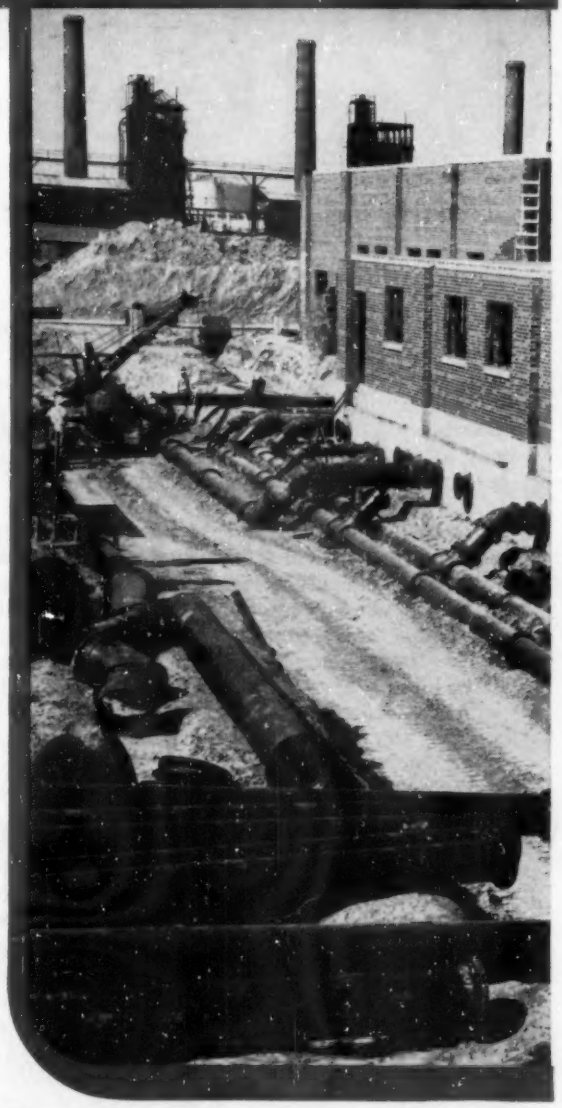
does more jobs better

Longevity, versatility — two words that describe cast iron pipe!

In *water* service, cast iron pipe is relied on coast-to-coast for fire protection, feeder and distribution mains, purification plants. In *gas* service, it's the choice for distribution and feeder lines. In *sewerage* systems, it serves in thousands of communities for force mains, outfalls, treatment plants. In *industrial* service, a wider scope yearly.

But no matter where or how it's used, cast iron pipe delivers the rugged strength whose service life is measured in centuries.

For information, write: Cast Iron Pipe Research Association, Thomas F. Wolfe. Managing Director, 122 So. Michigan Avenue, Chicago 3, Illinois.



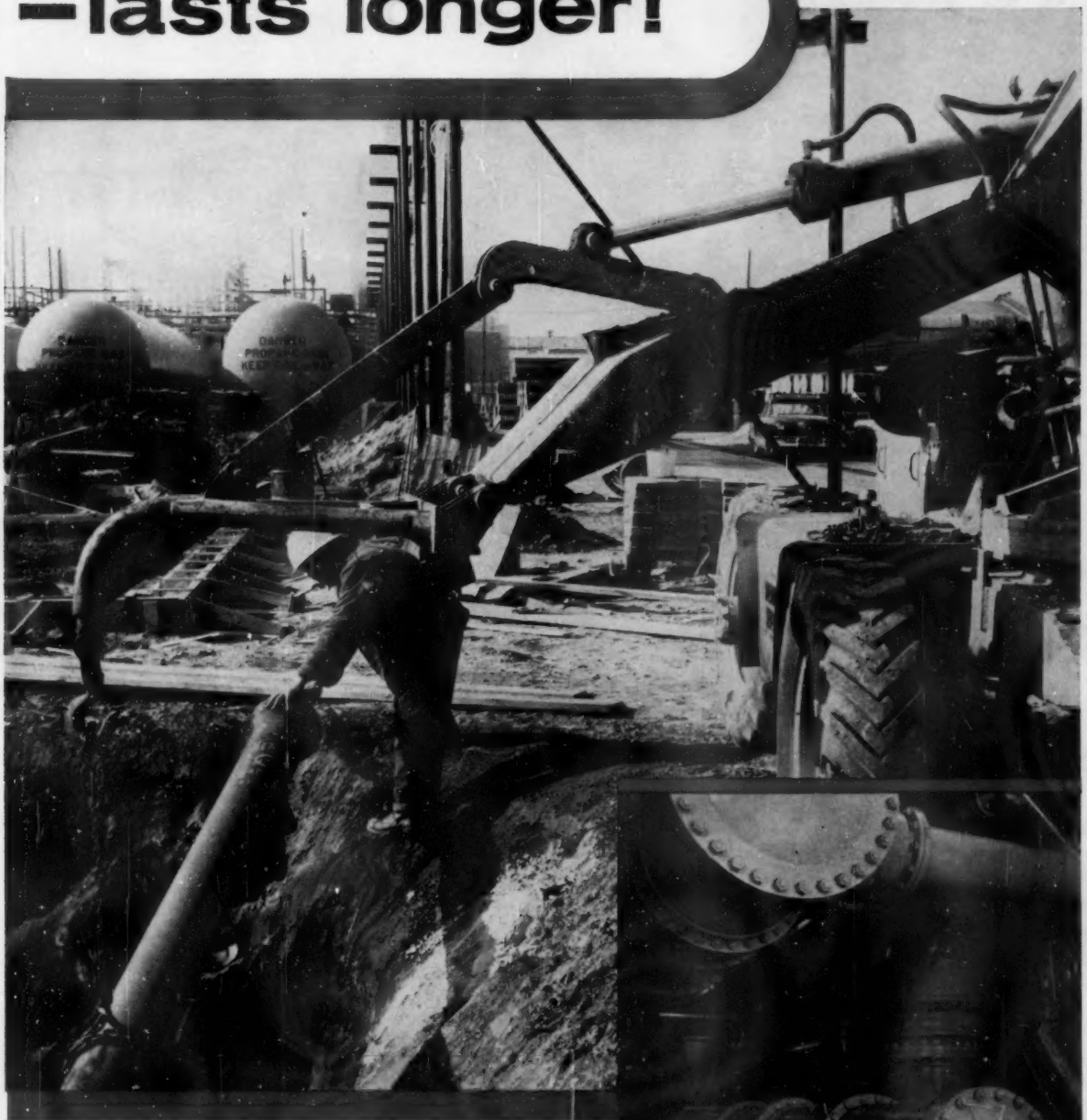
Robinson, Ill.— Mechanical Joint cast iron pipe being installed at Ohio Oil Company Refinery.

CAST IRON

Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.

CAST IRON PIPE

—lasts longer!



Chicago Heights, Ill.—Cast iron pipe being installed to supply water for plant of Victor Chemical Company.

International Falls, Minn.—Installation of flanged cast iron pipe and fittings in filter plant of Ontario Paper Co.

SERVES FOR CENTURIES...

KEEP STREET WORK "on Schedule"

FORTY FIVE, 120 brake hp, 23,800 lb

with the Allis-Chalmers FORTY FIVE

Backlogs change quickly to "on schedule" operations when you use an Allis-Chalmers FORTY FIVE motor grader on spring grading jobs. This machine's *extra output* features help you catch up fast and then keep you ahead. Measured in production — the FORTY FIVE gives you more work per grader, more work per operator.

HERE'S HOW IT'S DONE

REAL WORK POWER — Allis-Chalmers 120-hp diesel engine with follow-through combustion provides outstanding lugging ability . . . furnishes all the power you need to roll big windrows. Smooth performance, clean combustion, extra long life keep your jobs on the move.

BIGGER LOADS — the ROLL-AWAY moldboard puts action into every load. Because load rolls up and ahead of the moldboard, you handle bigger capacities at no increase in operating costs.

EASY, PRECISE CONTROL of every blade position is yours with exclusive toggle-type levers that engage jaw clutches without kickback. Mechanical action provides a positive "feel," giving you the precise operation you want.

PASSENGER CAR COMFORT for operators gives owners an extra measure of performance on all grading jobs. Fully enclosed power steering; adjustable foam rubber seat; clean, roomy platform; good visibility, plus many other features, helps operators stay at peak efficiency through an entire shift.

Your Allis-Chalmers dealer will show you a FORTY FIVE at work in your area. He offers sound equipment recommendations, a full parts stock, and complete maintenance and service facilities to meet your needs.

ROLL-AWAY is an Allis-Chalmers trademark.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

Now is the best time to let your Allis-Chalmers construction machinery dealer help you get ready for spring work.

ALLIS-CHALMERS

Proven Leadership*

*IN 1956 . . . MORE UTILITIES BOUGHT

POWERS American

SERVICE BODIES

THAN ANY OTHER MAKE

HERE'S WHY! Powers-American builds *fine* service bodies . . . and *builds them to last.*

Powers-American can furnish the *just right* body for any service job—standardized for greatest economy . . . modified-standard, to fit individual job needs . . . custom-made, to meet specific operating requirements.

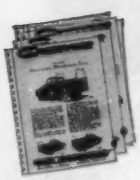
Whether you have one truck or the largest fleet . . . you'll find it worthwhile to get details from Powers-American next time you need service bodies for your operation.

SERIES 350 Bodies have an under-floor winch, a fold-over derrick, and an extension ladder. Compartments are equipped to carry a variety of service tools, parts, and materials.

SERIES 25 Bodies are available in standard models equipped specifically for telephone, electric, gas, or water meter installation and service.

SERIES 44L Bodies have same construction features as Series 44 Bodies described above . . . plus a shelf-equipped superstructure, available with or without roof.

SERIES 450 Bodies, designed for light duty construction and maintenance work, are equipped with a revolving aerial ladder, an underfloor winch, and an easy-to-use derrick.



Descriptive literature and price information is yours for the asking

SERIES 44 Bodies . . . in 75", 90", and 104" lengths . . . are designed for service work in any phase of the utility industry. Equipped with bins, racks, material hooks, and adjustable shelves. Available with optional items to fit individual work needs.

UTILITIES EXPECT MORE FROM POWERS American

McCABE-POWERS

AUTO BODY COMPANY

5900 NO. BROADWAY • ST. LOUIS 15, MO. 625 CEDAR ST. • BERKELEY 10, CALIF.

Rockwell Dual Unit Compound Meter Assemblies

EASIEST To Handle, Install, Service

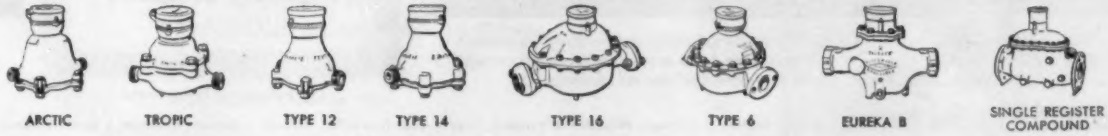
Big, bulky 8 in. compound meters are always a trial to install, even more of a problem to service. Now, with Rockwell—two meter single register compound manifolds you can save time and money. The complete assembly weighs approximately 100 lbs. less than a single big meter. Two men can handle it with ease. Maintenance of this Rockwell unit is a cinch. Either meter can be used to record off-peak loads while a new or repaired meter is being installed. And remember, Rockwell Dual Unit meter assemblies are razor sharp in the measurement department. They record *all the flows* with far greater accuracy than a single 8" compound. And they cost less. Write for latest bulletin.

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Tex. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

ROCKWELL WATER METERS

A Size and Type For Every Kind of Service



LEADERS IN PUBLIC WORKS

Roy L. Phillips has been City Engineer of Meadville, Pa., from 1918 until his retirement on December 31, 1956. Our cover picture shows him conferring for the last time in his official capacity with his successor, **Robert R. Perry** who took over as City Engineer on January 1. Mr. Phillips' accomplishments have been many. Under his direction, a sewage treatment plant was built in 1933, financed by a special 2-mill tax collected in advance. Meadville is one of the state's best-paved cities, with 48 miles of paved streets. An airport, park and recreation areas and a modern incinerator were other contributions to the betterment of Meadville during his administration.

Born in Meadville, Mr. Phillips received his engineering degree from Allegheny College in 1910. During the next eight years he did railroad civil engineering, consulting work and teaching. He is a Registered Professional Engineer and has been active in many engineering groups, including the APWA, the local sections of the ASCE and the Pennsylvania Sewage Works Association. After a vacation trip, Mr. and Mrs. Phillips will continue to reside in Meadville. His successor is Robert R. Perry, Assistant Engineer since 1954, a graduate in Sanitary Engineering from Penn State and possessor of a MSCE degree from Purdue. After wartime service with the Navy in the South Pacific, Mr. Perry engaged in engineering in the Western Pennsylvania area. He is married and he and Mrs. Perry have two children. A Registered Professional Engineer, he is a member of and has been active in numerous technical societies.

NOW It's A FLEET OF 31 TRACTOMOTIVE TL-12 TRACTO-LOADERS

Sold By E. F. Craven Co., Greensboro, N. C.

for the North Carolina State Highway & Public Works Commission

Helping to keep the roads of North Carolina in top shape is the job of a fleet of TL-12 Tracto-Loaders — 31 in all!

"We like their all-round ability," says the North Carolina State Highway Maintenance Department. The TL-12's load crushed stone, sand, gravel or topsoil as needed. Pick up and load excess material pulled from slopes and ditches. Handle general utility work — such as loading pipe and drums of oil.

You not only get your money's worth from the TL-12's ability to do many jobs well . . . you save money on every job because these 1⅓-yd excavator-loaders work faster, and there's less maintenance.

Every load is a big load with the tip-back bucket and smooth, positive hydraulic torque converter drive. And you go forward or reverse simply by pulling or pushing a lever — no shifting. You place material right in the center of the truck, too — no tires protruding ahead of cowl to rob you of valuable reach . . . no wasting time leveling load.

And here are real trouble-savers! Dump cylinders are out of the way and out of the dirt. Hydraulic system has double filter protection with both screen and magnetic filters.

But get the full story from your Allis-Chalmers construction machinery dealer. Let him show you why.

TRACTO is a sure sign of modern design

SOLD AND SERVICED BY YOUR ALLIS-CHALMERS CONSTRUCTION MACHINERY DEALER

Send For Free Descriptive Catalog On The Complete Line Of Tracto-Loaders

TRACTOMOTIVE

TRACTOMOTIVE CORPORATION • DEERFIELD, ILLINOIS

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Deerfield, Illinois

☐ Please send Tracto-Loader Catalog
☐ Have salesman call

Name .....
Title .....
Company .....
Address .....
City .....State .....

LOOK! NEW FORD

The boldly modern styling you see in new Ford trucks for '57 only *hints* at how deep-down modern they really are!

These deep-down modern Fords bring you important new advances in power, more durable frames, stronger axles and springs, and completely new cabs with structural design improvements.

'57 Ford trucks are so modern . . . *so new* you've just got to see what they can do. Get in touch with your Ford Dealer now!

New T-800 Tandem, Max. 45,000-lb. GVW. High torque 212-hp V-8 engine, 4-barrel carburetor and power steering standard and at no extra cost.

LOOK again!

They're modern through and through

NEW Cabs—completely new—stronger, roomier, smarter! New wider full-wrap windshield. New inboard cab step, new Hi-Dri ventilation, new easy-to-read instrument panel!

NEW Hydraulic clutch, standard in all models from pickups to tandems. Easier to operate—works like hydraulic brake. Clutch and brake pedals are suspended type for extra driving ease!

NEW Styleside pickup bodies, standard at no extra cost. America's biggest pickup bodies! Built wider with all-steel rugged box-section corner reinforcements and recessed taillights. Side loading's far easier with full-width body.

New riding comfort! Big roomy cabs, with increased visibility, new suspensions for greatly improved riding and handling ease.

NEW chassis and body strength! New frames, up to 13% stronger. New sturdier axles! New higher capacity springs! New stronger, more durable cabs.

NEW power advances! New higher horsepower, new freer breathing, new higher compression, new Super-Filter air cleaner. New advancements from camshafts to carburetors! Modern Short Stroke design in every engine—V-8 or Six.

New F-100 pickup with Styleside body standard at no extra cost. Half-ton models are available in both 6½- or 8-foot body lengths.

City ..... State .....

TRUCKS for '57

New F-750 Big Job (22,000-lb. GVW). New stronger frame, new stronger cab construction, 196-hp Heavy Duty V-8, 4-barrel carburetor standard.

For '57 and the years ahead —

FORD TRUCKS COST LESS

. . . LESS TO OWN . . . LESS TO RUN . . . LAST LONGER, TOO!

ALLIS-CHALMERS ADVANCED DESIGN

turns waste time into work time

You get *extra* money-making *work time* with an Allis-Chalmers crawler tractor on every job—dozing, winching, towing, pushing. Built for today's jobs, these crawlers are wheeling out more work in less time than comparable size machines.

Look at the facts

1,000-hour lubrication intervals save lube time

Allis-Chalmers tractors start the day with *go*—not greasing. You can operate six months on a 40-hour week basis with just one lubrication of truck wheels, front idlers and support rollers. Designed with Positive Seals and tapered roller bearings, these units are protected from dust, loose sand, soft ground, mud or water. You not only gain *working time*, but save labor and lubricant costs as well. And there's no costly damage from greasing neglect.

Modern shift pattern speeds digging

Here's a big timesaver on dozer work. It takes just half the time and effort to change from low forward to fast reverse with the Allis-Chalmers HD-6, HD-11, or HD-16 transmission. One simple shift of the gear lever does the job. You gain production time—up to 25 percent on actual test—on bulldozing, backfilling and other jobs calling for a short forward-backward cycle.

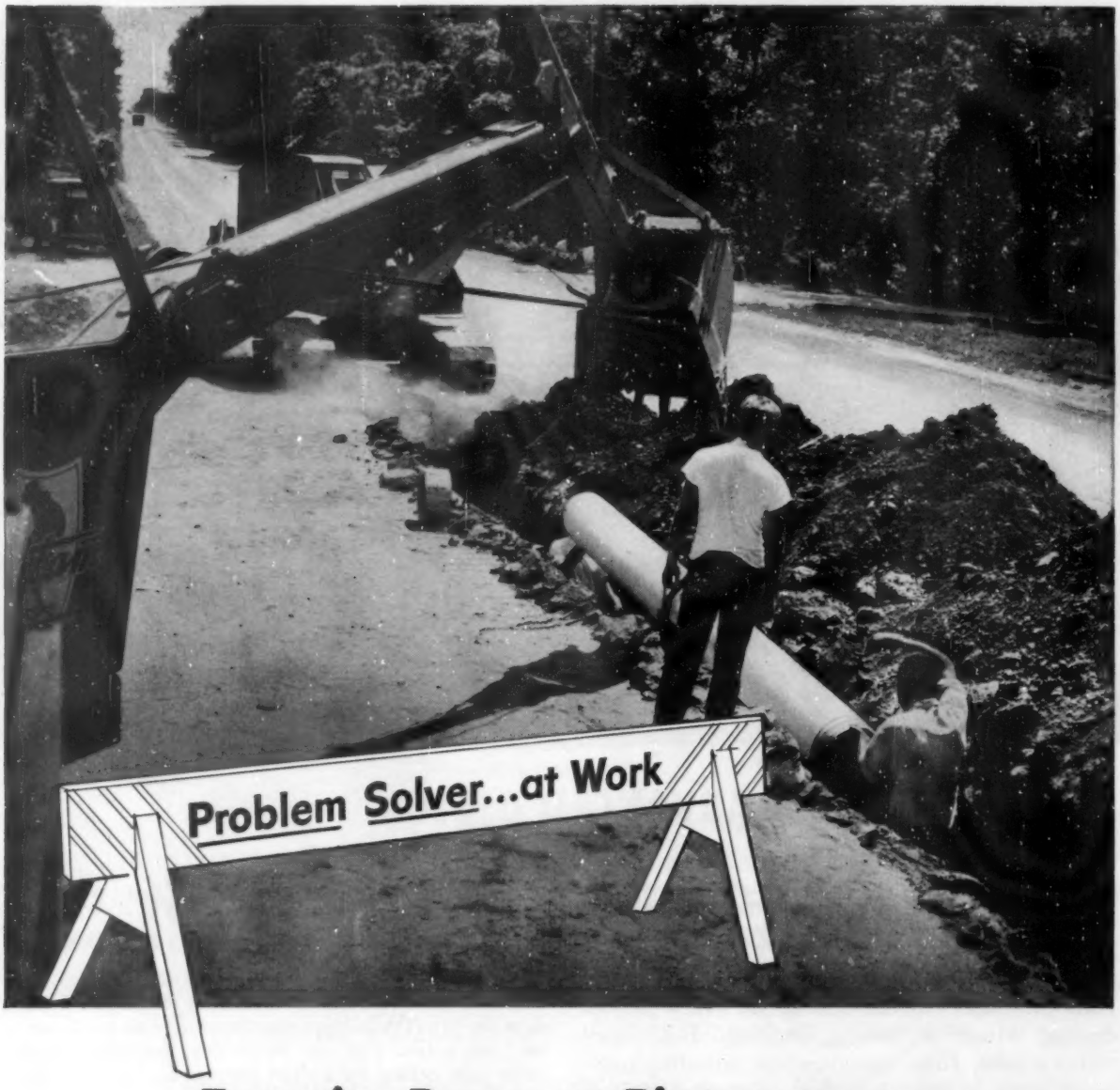
Unit construction cuts servicing time

No need to remove transmission or engine, radiator, grille, when servicing or removing an Allis-Chalmers master clutch. This unit can be removed without disturbing adjacent parts. This is also true of other main assemblies—final drive gear, transmission, steering clutches, engine and truck frame. You can quickly substitute an assembly and put the tractor to work while servicing the original unit. As a result, hours of *costly service and downtime are saved* because of Allis-Chalmers advanced design.

These are just three examples of Allis-Chalmers timesaving, money-making features. Your Allis-Chalmers dealer can point out many more. See him now for the full story.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS A-C



Transite Pressure Pipe assures dependable service through the years

ENGINEERS and city officials face much the same problem in pipe selection. It is twofold: (1) How to make sure the community gets many long years of trouble-free performance from its pressure mains, and (2) How to do this as economically as possible by choosing pipe for durability plus savings.

Transite® Pressure Pipe is solving this problem in hundreds of municipalities and water districts from coast to coast. Here's why. An asbestos-cement product, strong and durable and highly resistant to corrosion, it has effected economies in installation as well as operation.

For example, the community benefits even at the very outset, since both handling and assembly of Transite Pressure Pipe are so simple that crews can install as fast as trench is opened. This means lower installed costs.

Another Transite Pipe characteristic instantly recognized by engineers as of major importance is its smooth interior that stays smooth. This provides maintained high flow capacity. (Flow coefficient is C-140.)

* * *

For further information about Transite Pressure Pipe with the Ring-Tite® Coupling, write for Booklet TR-160A. Address Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JM PRODUCT

Johns-Manville TRANSITE PRESSURE PIPE
WITH THE RING-TITE® COUPLING

City of Dearborn, Michigan, Saves Money With Sherman Digger-Loader

The City of Dearborn's Water Department has found its Sherman Major Digger-Loader combination to be one of the most versatile pieces of equipment it owns.

The Sherman unit is used almost continually for pipeline construction work, laying water lines, setting fire hydrants, and for repairing and maintaining water and service lines to homes.

Once the excavation is completed, the Loader takes over. Loading trucks with a fast cycling Sherman Loader, cleaning up around a job, backfilling, grading and levelling, stripping . . . all are performed quickly and economically with the same basic piece of equipment which was used to dig the hole *and* by the same operator.

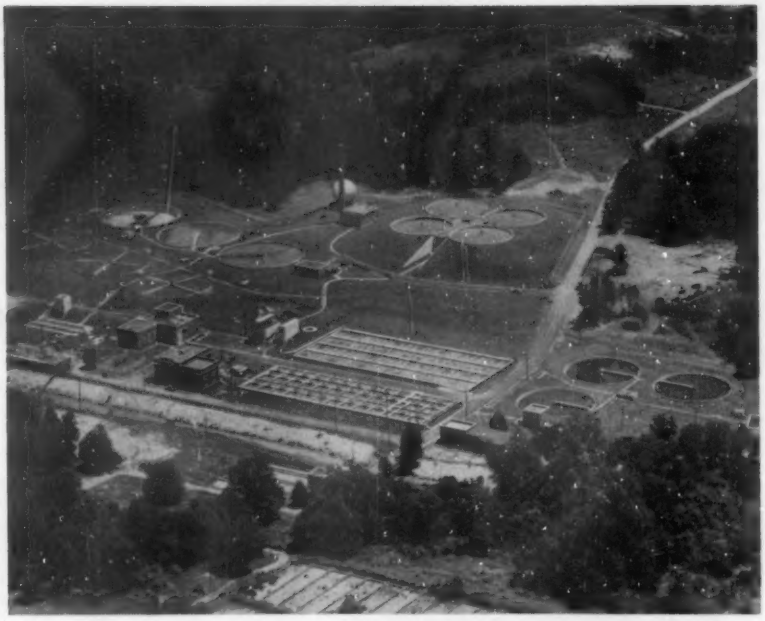
As Mr. Molner, the operator, puts it, "We couldn't do the jobs we are doing with any other machine. We've got to have the power and strength the Sherman Major offers to dig as hard and as deep as we do. We also use the unit to load our machinery on and off the trucks, to lower pipes and hydrants into trenches and holes, etc."

Other cities, too, are finding out how this *economical* Digger-Loader combination can save them money. Call your local Ford Tractor dealer today or write for Bulletin No. 357.

See the Sherman
Power Digger soon
at your local
FORD TRACTOR DEALER

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN
POWER DIGGERS* • FRONT END LOADERS • FORK LIFTS

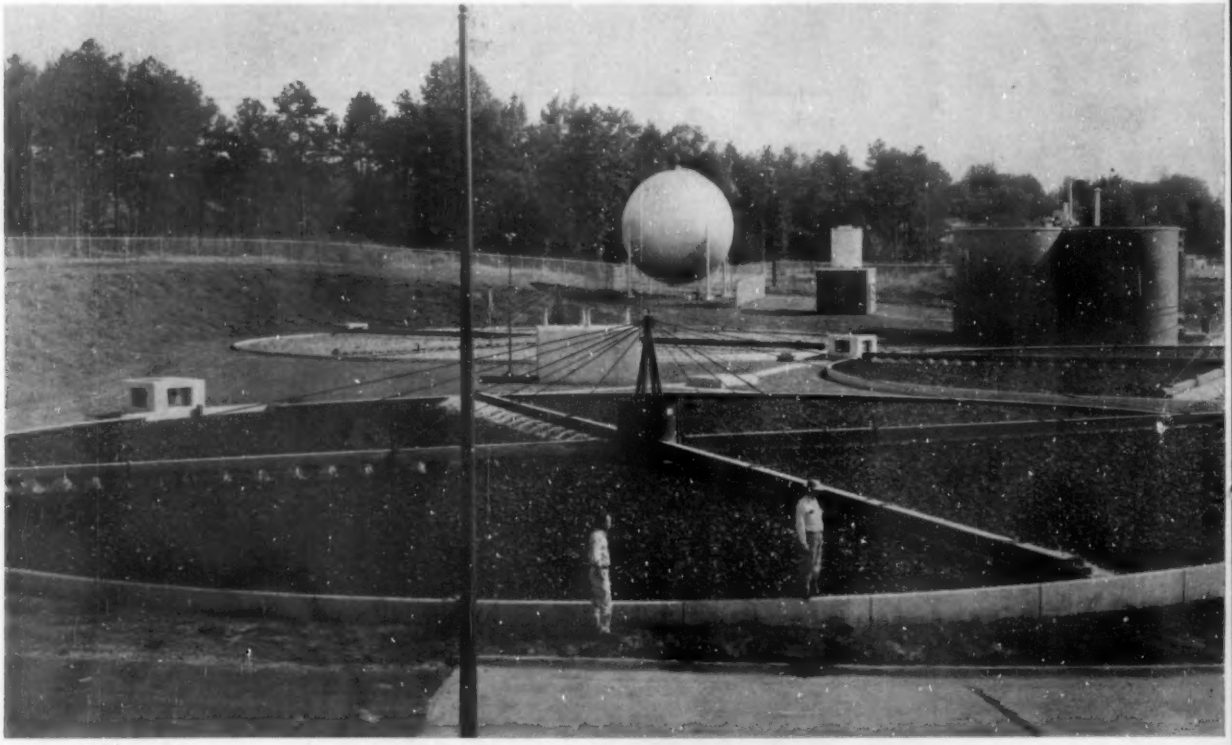
*Designed, Engineered and Manufactured jointly by Sherman Products, Inc., Royal Oak, Michigan. Wain-Roy Corporation, Hubbardston, Mass.



Air view of part of Sugaw Creek treatment plant, Charlotte, with aeration units in center. Originally designed by Wm. M. Piatt, Consulting Engineers, Durham, N.C.

The City Selected To Treat And

Irwin Creek plant, Charlotte (below), designed by J. N. Pease Co., Engineers, Charlotte, N.C.



High rate trickling filters at Irwin Creek plant, Charlotte, each 125 feet in diameter, provide intermediate treatment by leveling off BOD loads imposed on the plant by industrial wastes.

TRICKLING FILTER

Of Charlotte, N. C. Trickling Filters Combined Domestic Industrial Wastes

General Contractors, Rea Construction Co., Charlotte, N.C.

***Major Equipment by:* Process Engineers, Inc., Pacific Flush Tank Co., Link-Belt Co., Fairbanks Morse & Co., Chicago Pump Co., and Marlow Pumps Division.**

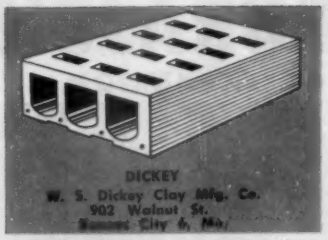
Trickling filters in both of these Charlotte treatment plants included vitrified clay underdrain blocks of standard TFFI specifications. One advantage gained was the flexibility afforded by trickling filters in treating combined domestic and industrial wastes. Both plants are operated by the City of Charlotte Water Department.

Some Other Advantages of Trickling Filters

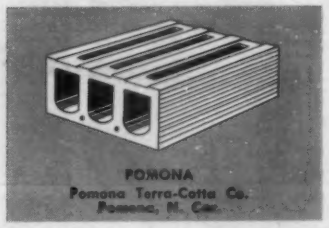
- *Low First cost and operating costs.*
- *Simple easy operation.*
- *Long life—longer than that of the bonds issued to pay for plant.*
- *Overload is no problem. Take temporary and shock loads in stride.*
- *Good results: top-notch effluent, day in and day out.*

TFFI

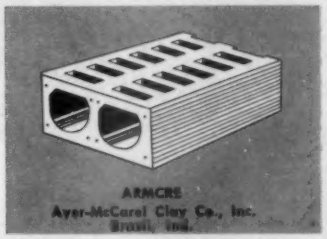
Symbol of good treatment



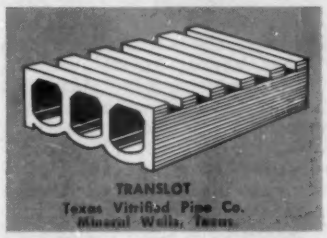
DICKEY
W. S. Dickey Clay Mfg. Co.
902 Walnut St.
Kansas City 6, Mo.



POMONA
Pomona Terra-Cotta Co.
Pomona, Cal.



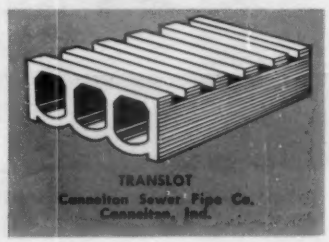
ARMCRE
Ayer-McCarel Clay Co., Inc.
Brazil, Ind.



TRANSLOT
Texas Vitrified Pipe Co.
Mineral Wells, Texas

BOSCO
Bowerston Shale Co.
Bowerston, Ohio

NATCO
Natco Corporation
327 Fifth Ave.
Pittsburgh 22, Pa.



TRANSLOT
Connelton Sewer Pipe Co.
Connelton, Ind.

FLOOR INSTITUTE

PROFESSIONAL OPPORTUNITIES

Yale Traffic Bureau Will Increase Training Program

The Bureau of Highway Traffic at Yale University is increasing its training program to help meet the current high demand for engineers trained in street and highway operation. This traffic engineering course is at the graduate level and covers a full academic year with classes starting in September and terminating the following May. It is devoted entirely to highway traffic operations and is designed to equip men for responsible positions in this field of work upon graduation.

The courses include (1) traffic characteristics and measurements, (2) traffic regulations and control devices, (3) traffic facility planning and design; and (4) highway administration and finance.

The Bureau will offer a number of fellowships to citizens of the United States who are qualified for graduate work. All of the fellowships provide a living stipend of $1,400 disbursed at the rate of $175 per month for a period of eight months while a student is enrolled. The fellowships also provide the tuition fee of $600 which amounts to a total value of $2,000 for each fellowship. In addition to the fellowships, the Bureau offers tuition scholarships to qualified municipal and state highway engineers who will receive salaries from their employers while undertaking the work.

Applications for admission and fellowships may be obtained by writing to Fred W. Hurd, Director, Bureau of Highway Traffic, Yale University, Strathcona Hall, New Haven, Connecticut. The closing date for applications is March 1.

Study and Research in Sanitary Engineering

The Department of Sanitary Engineering of the University of North Carolina has announced graduate study and research courses in sanitary engineering and sanitary science. Specific degree programs include Master of Science in Sanitary Engineering, Master of Public Health, and Master of Science in Public Health. Research opportunities and graduate and research assistantships are available. Information from the Dept. of Sanitary Engineering, School of Public Health, University of North Carolina, Box 899, Chapel Hill, N. C.

...how TD-9 4-in-1 Skid-Shovel

"runs" sanitary landfill.. "doubles" on street jobs

—for Montpelier, Vermont!

Montpelier put out its reeking, 56-year-old dump fire in July of '56—quickly eliminated a rat-reservation; a potential, disease-breeding vermin preserve; a perennially-unpopular and malodorous smog-and-smoke producer! Vermont's capital city (population 8,500) did this by starting a sanitary landfill on the old dump-site—with America's most popular refuse-disposal equipment: an International Drott Four-In-One Skid-Shovel. Their choice, the TD-9 Four-In-One, *takes less than four hours daily* to spread, compress, cover, and compact the every-day refuse delivery—an estimated 400 to 500 cu yd of loose garbage and rubbish.

Then the same operator takes the TD-9 Four-In-One into town—does street work the rest of the day—loads street base and surfacing materials; does clean-up jobs; digs, dozes, grades, back-fills, or spreads; helps wherever needed. Montpelier gets typical International Drott Four-In-One *versatility unlimited*—saves the need of owning a second crawler!

"We have found no limitations of TD-9 Four-In-One applications," reports Montpelier's City Engineer, John A. MacKensey. "It's the ideal machine for combined operations like ours."

Obtain cover dirt with surface-skimming action that "boils" in the earth like a carry-type scraper—using Four-In-One Bullclam position, under accurate clam lip control. Or dig cover dirt with powerful Four-In-One Skid-Shovel action.

Spread "cover" evenly on the go—regulate amount by controlling clam lip—with Four-In-One in Bullclam position. Then you can iron down the "cover" to make a positive odor-squelching seal—using compactor plate action, plus added pressure of full bucket!

To spread or spot-place refuse evenly, simply use Four-In-One as clamshell or bulldozer. You obtain any Four-In-One action *instantly* by a finger-tip flick of the machine selector lever!

Loading street-base material, obtained fast with exclusive triple-power pry-action break-out and 42° ground-level bucket roll-back. The TD-9 Four-In-One pays *double dividends* on every Montpelier tax dollar—*with dual-duty efficiency!*

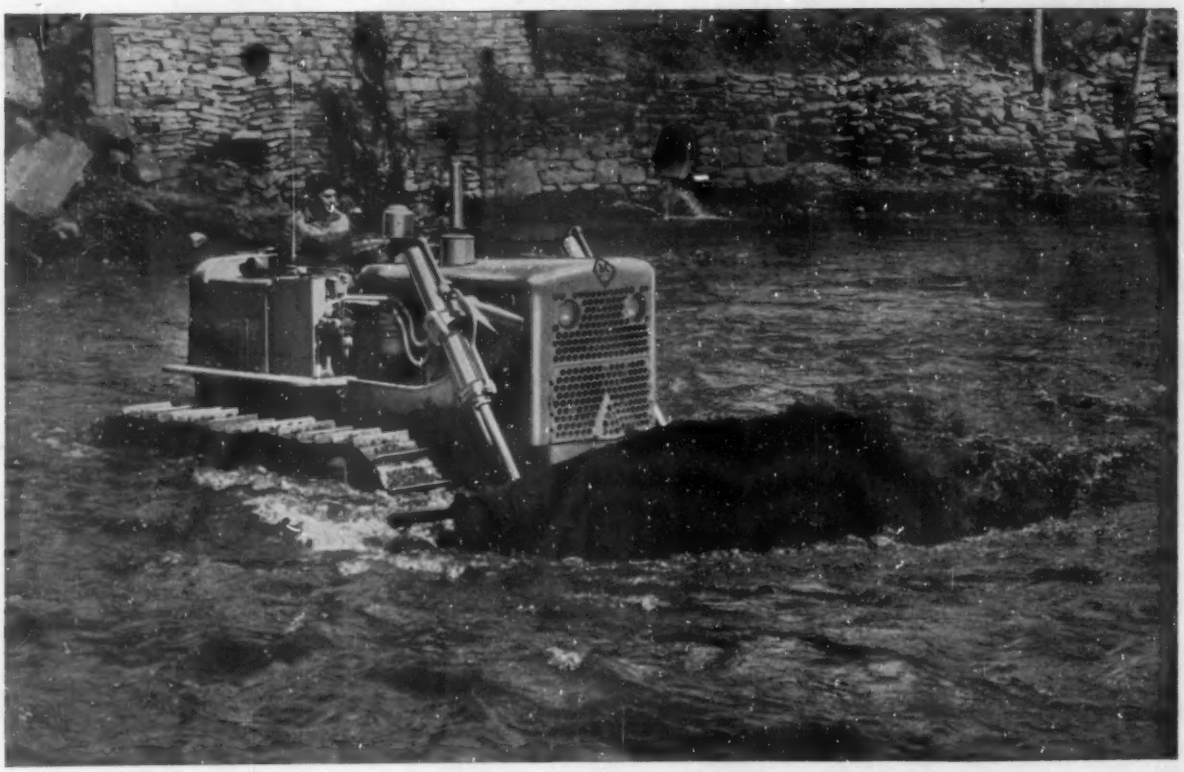
To compress bulky refuse, apply compactor-plate ironing action—simply by rolling the lowered Four-In-One forward. You can also apply hydraulic down-pressure to really flatten cans and cartons!

Why not find out what an International Drott Four-In-One Skid-Shovel can do for your city? Compare cost-cutting Four-In-One versatility and capacity. Prove the machine-protecting, comfort-adding advantages of exclusive, shock-swallowing Hydro-Spring (standard equipment). See your International Drott distributor for a demonstration!

INTERNATIONAL HARVESTER

INTERNATIONAL®

DROTT®



Restoring river bed after heavy flood requires track-deep operation in water and silt

Positive Seals in Allis-Chalmers HD-11B tractor effectively keep out damaging dirt and water

Considerable work was required in Scranton, Pa., recently to restore the Lackawanna River bed and banks after a disastrous flood had caused waters to rise 15 to 20 feet above normal. Channels had to be cleared, creeks widened, dikes built on river banks and, in some places, the river even had to be changed back to its original course.

Restoration work was carried on by Sweeney Brothers, Scranton contractors, under the direction of the Pennsylvania Department of Forests and Waters. Key machine on one phase of the project, an Allis-Chalmers HD-11 tractor-bulldozer, often worked track-deep in water and silt while clearing channels of mud and wreckage. The dozer also maintained roads for the fleet of seven trucks hauling material from the river.

The HD-11B proved to be an ideal machine for this job, according to Thomas J. Collins, Sweeney Brothers president. "This is our first piece of Allis-Chalmers equipment and I'm happy with it. The unit has been subjected to very tough conditions and has stood up well. Considerable saving has been made because Allis-Chalmers 1,000-hour lubrication seals keep dirt and water out of truck wheels, rollers and idlers."

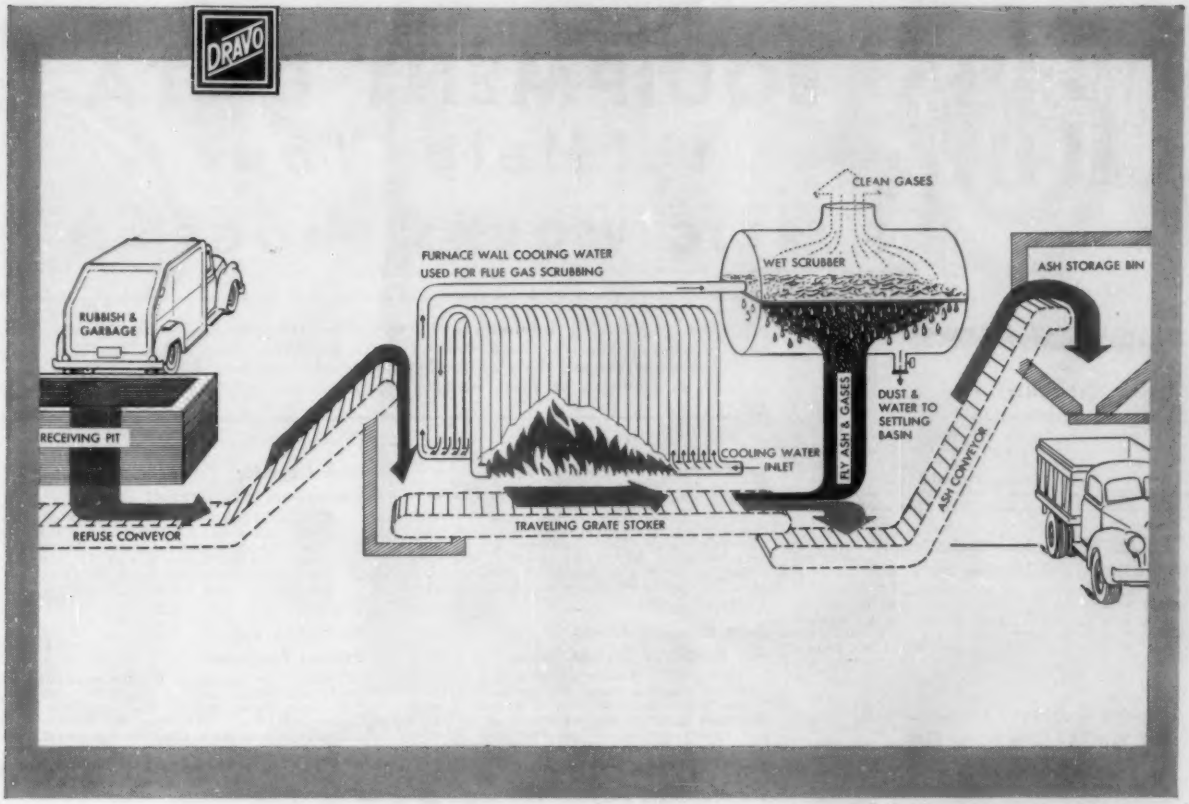
The spring-loaded *Positive Seals* that permit 1,000-hour lubrication on truck wheels, idlers and support rollers are only one of the many outstanding features of Allis-Chalmers tractors.

HD-11B

94 belt hp • 24,800 lb (approx.) as shown

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



for Economical, Sanitary, Dependable Refuse Disposal...

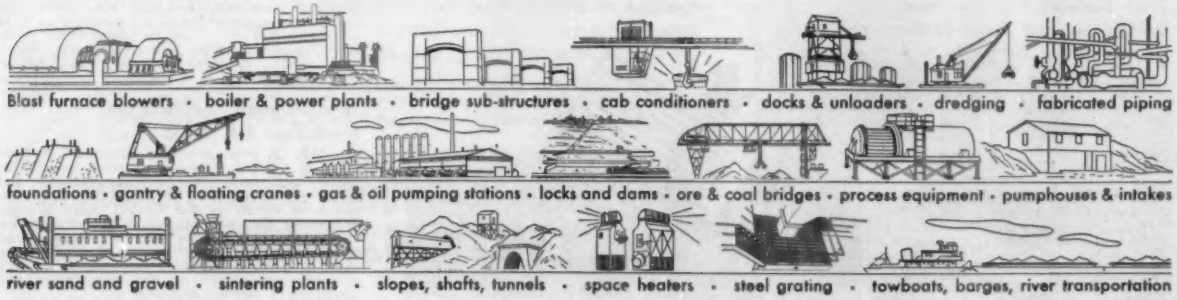
DRAVO INCINERATORS

Dravo Incinerators are scientifically designed to provide continuous, controlled combustion of *all* burnable refuse, regardless of moisture content. Combustion is so complete that there is no smoke and no odor. Fly ash discharge from the plant is far below code requirements.

The Dravo Incinerator is a complete package, including receiving pits, automatic refuse handling system, automatic combustion controls, traveling grate stoker, wet type flue gas scrubber, residue discharge conveyor and everything necessary for the efficient operation of the plant with minimum personnel.

The unique design of the Dravo Incinerator furnace provides for the most economical construction and operation. If yours is among the many communities that are turning to incineration for efficient refuse disposal, it will pay you to learn how Dravo Incinerators can save you money in both first cost and operation. Write to DRAVO CORPORATION, DRAVO BUILDING, PITTSBURGH 22, PENNSYLVANIA.

DRAVO
CORPORATION



FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

NEW LISTINGS

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the reply card, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

How to Get Better Concrete Construction

93. A report on the use of "Pozzolith" as a means of increasing the strength and durability and reducing the permeability of concrete structures, while reducing costs at the same time, is presented by Master Builders Co., Cleveland 3, Ohio. Check the reply card today.

Actual Mechanical Operation of a Refuse Collection Body

387. The operation of the Colectomatic refuse collection body in printed form is available from The Heil Co., Milwaukee 1, Wisc. This type of literature explains fully the operation of the mechanism and also gives the complete specifications and dimensions of these units. Check the reply card today.

Jointing Compound For Concrete and Vitrified Clay Sewer Pipe

391. Seal joints in concrete or vitrified clay sewer pipe in winter or summer with Pioneer #801 sewer joint compounds. This cold-applied plastic bituminous sealer is described fully in literature available from Pioneer Products Div., Witco Chemical Co., 122 East 42nd St., New York 17, N. Y. Check the reply card today.

Drafting Machines For Drafting and Designing Departments

393. The Vemco drafting machine combines all the working features of a T-square, protractor, and various scales and triangles. For illustrated bulletin on this piece of drafting equipment write V & E Mfg. Co., Dept. A-2, P. O. Box 950-M, Pasadena, Calif., or check the reply card.

Selenium Rectifiers For Cathodic Protection Systems

408. Rectifiers for cathodic protection systems that are designed for easy and rapid installation and that are engineered for minimum attention and maintenance are covered in literature available from Harco Corp., Cathodic Protection Div., Cleveland 28, Ohio. Check the reply card for specifications and operation.

Clean Sweeping Made Easy

415. The two models of Littleford road brooms available sweep two ways, have adjustable brush speeds and a hydraulic lift that raises and lowers the brush and regulates the correct sweeping pressure. For full details write Littleford Bros., Inc., 443-457 East Pearl St., Cincinnati 2, Ohio, or check the reply card.

Steel Sheeting For Trenchers, Cofferdams and Shore Protection

354. Lightweight corrugated steel sheeting is described fully in literature available from Armco Drainage & Metal Products, Inc., Middletown, Ohio. Types of sheeting, salvaging, physical properties, driving data, typical sheeting jobs and wales and struts tables are some of the sections covered. Check the reply card.

Catalog on Utility Bodies and Equipment

360. General service bodies, line construction bodies, aerial equipment, winch and derrick equipment and trailers are the units covered in this catalog. For design, dimensions, illustrations and descriptions check the reply card or write McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis 15, Mo.

Centrifugal and Turbine Type Pumps For Water and Sewage Plants

321. Turbine-type pumps, close or flexible couple drive, side suction centrifugal pumps and mixed flow pumps are described in Catalog M available from Aurora Pump Div., The New York Air Brake Co., Loucks at Dearborn, Aurora, Ill. Included is a pump selection guide. Check the reply card.

Split Coupling Clamp For Repair of Broken Mains

326. Splice broken mains with a Skinner-Seal split coupling clamp that permanently seals breaks with malleable iron compression rings cast with finger projections and moulded with a soft rubber gasket. Check the reply card or write M. B. Skinner Co., South Bend, Ind. for your description of this clamp.

All-Aluminum Supports For Traffic Control Programs

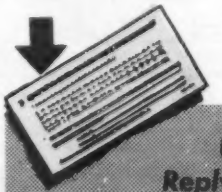
64. Design and specifications of all-aluminum supports for traffic control signals and signs are covered in a 20-page catalog just released by Pfaff & Kendall, 84 Foundry St., Newark 5, N. J. Type of supports described are as follows: Trombone type standards for horizontal signal over roadway; mast-arm type standards for vertical signals; truss type span for lane traffic signals; structural truss type span for horizontal signs over roadway; pedestals and sign supports. Check the reply card for your copy.

Chlorine Evaporator Catalog

349. Fischer & Porter Co., 889 Jacksonville Road, Hatboro, Pa., has available Catalog 70-21 that describes the chlorine evaporator. The new unit has a maximum capacity of 6,000 lbs. of chlorine per day. Check the reply card for your copy.

Truck Loader With Self-Loading Bucket

446. A self-loading bucket that will fit onto most all types of trucks is fully illustrated and described in literature available from M-B Corp., New Holstein, Wisc. Specifications and installation instructions are covered. Check the reply card.



Use the Reply Cards Inside Front Cover

High Capacity Continuous Mix Asphalt Plants

334. A 34-page, 3-color catalog describes all of the components of Barber-Greene's Model 848 continuous-mix asphalt plant. Check the reply card or write Barber Greene Co., Aurora, Ill., for information on the mixer, several varieties of dryers, dust collectors, elevators and bins.

Sanitation and Process Equipment

420. The equipment for the separation of solids from liquids and for liquid clarification is fully described in Bulletin 51-83 available from Chain Belt Co., Milwaukee, 1, Wisc. Grit chambers and washers, thickener equipment, conveyor sludge collectors, sludge removers, skimmers and all types of liquid clarification equipment are covered in the bulletin. Check the reply card today.

Diatomite Filters For Swimming Pools

424. Keep swimming pools clean and sparkling and clarify water and other liquids for industry by using Graver diatomite filters. How these filters work, filter elements, body feed equipment and backwashing are illustrated and described in Bulletin WC-115 available from Graver Water Conditioning Co., 216 West 14th St., New York 11, N. Y. Check the reply card.

Use The Reply Card

Modernize Utility Systems with Telemetering and Remote Control

452. Remote control of switch gear, pumps, motorized valves, blowers, and transmission of metered data from remote points make possible supervision of plant units and water and sewerage systems from a central point. Details of the Hammarlund Centralized Operation Control system are given in Bulletins AOD-390 and APO-188, available from Hammerlund Mfg. Co., Inc., 460 West 34th St., New York 1, N. Y., or by checking the reply card.

Protective Lining for Concrete Pipe and Structures

131. T-Lock Amer-Plate is a tough, long-lasting acid-resistant vinyl sheet lining for concrete pipe and structures which are exposed to corrosive materials. T-shaped ribs pressed in the sheet are embedded in the concrete as it is poured to lock the lining permanently in place. Get full details from Amercoat Corp., South Gate, Calif., or check the reply card for illustrated folder.

How "Gradall" Applications Meet Your Job Needs

310. A new, profusely illustrated bulletin showing Gradall machines at work on a wide variety of municipal, county, township and highway maintenance and construction jobs has been issued by the Gradall Div., Warner & Swasey Co., Cleveland 3, Ohio. Production figures are provided to show the work output of this machine on all sorts of applications. Get your copy by checking the reply card. It's a convenient review of the many ways you could use a Gradall machine.

To order these helpful booklets check the reply card inside front cover

DISCOVER DAVIS

THE EQUIPMENT THAT LEADS THE WAY

New Back-Hoes and Loaders for 1957 Make More PROFIT FOR YOU!

Here's a whole new era of profits for you. The new Davis 210 Back-hoe with three interchangeable mounting points so you can switch digging positions from center to side for flush digging alongside buildings, fences, etc....and its **exclusive hydraulic rotary boom swing cylinder** gives you a smooth, continuous 200° cushioned operating arc without ever changing a pin...an engineering achievement desired by all, but accomplished only by Davis. Both the new 210 and America's largest selling back-hoe, the Davis 185, have **7,000 pounds of breakaway** and new comfort design. They are both available as Davis' unique, low-cost, **truck-mounted back-hoes** that will fit any one-ton or larger flat-bed truck...compact in transport, self-powered, completely detachable. The popular **Davis Loader** has also been improved for greater utility...which means more profits for you in 1957, if you have Davis equipment.

Davis products are available for most popular tractors, and are sold and serviced anywhere in the United States and Canada by better dealers. See your dealer or write for literature. Please specify tractor and equipment you desire.


Davis Truck-Mounted Back-hoe from the transport to the digging position.


The Model 185 cleaning a ditch at right angles to the tractor


The streamlined Davis Loader on John Deere 420 Crawler Tractor

MID-WESTERN INDUSTRIES, INC.
1009 SOUTH WEST STREET, DEPT. P
WICHITA, KANSAS

To order these helpful booklets check the reply card inside front cover.

NEW LISTINGS (Cont.)

Welded Steel Pipe From 6 to 10-3/4 Inches in Diameter

382. High grade, butt welded steel pipe in diameters from 6 to 10-¾ inches, 10, 12 and 14 gauge and 20, 30 and 40 ft. lengths is described in literature available from Valley Mfg. Co., Valley, Nebr. This lightweight, plain or asphalt coated, choice of joints pipe is ideal for water and gas lines, well casings and heat exchanges. Check the reply card.

Unique Solution for Refuse Problem

447. Elimination of the municipal refuse disposal problem through an improved and rapid method of fermentation, which develops a marketable fertilizer is described in a booklet issued by the Organic Corporation of America, 247 Ft. Pitt Blvd., Pittsburgh 22, Pa. Either the city or Orcoa may own the plant, and a market for the fertilizer is assured. For complete information, check the reply card.

Hydraulic Backhoe For Many Makes of Tractors

456. A backhoe that digs sewer systems, culverts, water mains, foundations and ditches is described fully in literature from Henry Mfg. Co., Inc., 1700 N. Clay St., Topeka, Kans. Check the reply card for specifications and details.

Self-Propelled Backhoe For Water and Sewer Departments

470. For virtually every municipal, county and state lifting and digging job, the Bantam self-propelled Model CR-35 is the appropriate machine. It can lift up to 12,000 lbs. and dig up to 100 cu. yds. per hour. For more information write Schield Bantam Co., 234 Park St., Waverly, Iowa, or check the reply card.

One Man Field Tool Machines Any A-C Profile

475. Literature is available from Spring Load Mfg. Corp., 3610-D First Ave., South, Seattle 4, Wash., describing the Model B Spring Load A-C machinery and tapering tool. Also information on Spring Load A-C pipe cutters are included. Check the reply card.

We Clean Sewer and Water Pipes

487. American Pipe Cleaning Co. cleans sanitary sewers and water mains for municipalities by contract with the latest methods and equipment and by trained, experienced crews. Write American Pipe Cleaning Co., 1918 Nicollet Ave., Minneapolis, Minn., or check the reply card for information on this pipe cleaning company.

Joint Materials and Sealers Described in Latest Literature

492. Fibre material, asphalt board, cold pour joint sealer, crack fillers and concrete curing compound are described fully in literature available from Presstite-Keystone Engr. Products Co., 3906 Chouteau Ave., St. Louis 10, Mo. Check the reply card for information on these paving and building products.

Better Traffic Signs By Using Plyglaze Overlaid Plywood

496. Plyglaze high density overlaid plywood requires no protective paint coating when used for traffic control signs. The plyglaze surface provides an ideal base for permanent weatherproof bonding, and it will not check, blister or deteriorate when marred by bullet holes. For further information write St. Paul & Tacoma Lumber Co., Dept. P.W., Tacoma 1, Wash., or check the reply card.

Complete Treatment Unit for Handling Flows to 0.5 MGD

503. Developed for sewage flow characteristics of small communities, the Aerator-Clarifier is a complete treatment unit utilizing automatic balance of activated sludge solids with sewage flow. Bulletin 129, issued by the Chicago Pump Co., 422 Diversey Parkway, Chicago 14, Ill., describes application of this unit. Check the reply card.

Data on Mechanical Joint Tapping Valves and Sleeves

605. Eddy mechanical joint tapping valves and sleeves are described in literature available from Eddy Valve. Also described are repair sleeves for cast iron and asbestos cement water mains. Write Eddy Valve Company, Waterford, New York, or circle the reply card for your copy.

Hydrocrane Used As A Backhoe, Crane or Clamshell

606. When your work calls for lifting, digging and trenching all in the same day you need a machine that converts from crane to clamshell to hoe quickly and easily. Check the reply card or write Bucyrus Erie, South Milwaukee, Wisc. for information on the Hydrocrane.

●

WATER WORKS

Elevated Tanks and Other Storage Facilities

32. How engineers' designs and standard AWWA specifications are followed for fabrication and erection of water storage facilities are described in color illustrated booklet. Address the Darby Corp., Kansas City, Kans., or use the handy reply card.

To order these helpful booklets check the reply card inside front cover.

Four more improvements in the Barber-Greene Finisher

Four new improvements give the Barber-Greene Finisher faster speed, faster travel, lower maintenance cost and increased power.

Improving the Barber-Greene Finisher is not something new. Scores of major improvements have been embodied in its design since it was first released to the field 20 years ago.

These improvements have been incorporated without spectacular announcements or fanfare. They have all been based on vast experience. In fact, the Barber-Greene Finisher is now paving its second million miles, which is many times the mileage and tonnage records of all other asphalt paving machines in the world combined.

These are all proven, sound improvements developed from experiences in laying every type of mix, in virtually all conditions. Machines embodying this group of design changes are now in production and are designated as the Model 879-B.

Latest improvements include:

NEW TRANSMISSION—Provides both higher operating and travel speeds. The new transmission still provides 12 forward speeds giving a wider range of operation.

HIGHER SPEED TAMPER—This new design permits faster laying speeds and reduces maintenance costs.

NEW CRAWLERS—Precision-drilled pads and larger pins will further decrease maintenance costs.

NEW POWER UNIT—20% more power. This means pushing even bigger trucks, handling even steeper grades, greater reserve for high altitude, and higher speeds of operation.

Note To Barber-Greene Finisher Owners

These latest improvements, as well as many previous improvements, can be incorporated in your old machine. Necessary parts are now made up in kit form for each modification separately. A folder describing the various kits is available.

57-3-F

Barber-Greene BG

AURORA, ILLINOIS, U.S.A.

CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT

To order these helpful booklets check the reply card inside front cover.

Waterstops For Expansion and Construction Joints

19. A polyvinylchloride waterstop "Durajoint", that is resistant to extreme waterhead pressures, tensile strength of not less than 1900 psi, chemically inert and available in easy to handle 50 ft. coils is described fully in literature from W. R. Meadows, Inc., 24 Kimball St., Elgin, Ill., or Tecon Products Inc., 304 S. Alaskan Way, Seattle 4, Washington.

Ball and Socket River Crossing Cast Iron Pipe

33. Literature is available describing Clow ball and socket cast iron pipe for river crossing, or any installation where full 15 degree free turning deflection is desirable. For full description and specifications, address James B. Clow & Sons, Inc., P. O. Box 6600-A, Chicago 80, Ill., or check the reply card.

Meters and Instruments For Water Works

43. An attractively arranged 20-page booklet issued by Sparling Meter Co., 225 No. Temple City Blvd., El Monte, Calif. furnishes concise data on the full line of Sparling meters, indicator-totalizer-recorder instruments and other special instruments and controls. Check the reply card for your copy, or write for Bulletin 314.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal control of certain tastes and odors plus other aids in high quality water production. Check reply card for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa., or check the reply card.

Engineering Information and Water Distribution Products

49. Helpful engineering information, covering water distribution problems, is available from Mueller Company in their W-96 Water Works Catalog. The 328 page catalog features a quick reference sectional indexing arrangement for easy location and identification of the hundreds of water distribution and service products illustrated. Check the reply card and you will receive detailed information on a complete line of water works equipment.

Handbook of Cast Iron Pipes and Fittings

52. Full engineering data on products of the Alabama Pipe Co., including Super De-Lavaud cast iron pressure pipe and pipe fittings, valve boxes and other municipal castings are provided in Pressure Pipe Catalog No. 54, a 196-page publication of Alabama Pipe Co., Anniston, Ala. Weights, dimensions and specifications are clearly indicated in this easy to use reference. Requests for this valuable publication should be accompanied by your business letterhead.

Verti-Line Primary Water Supply Pumps

110. Vertical turbine pumps for industrial and municipal primary water supply are described in an 8-page bulletin No. 100. Sectional illustrations with enlarged views of special features of the products and detailed drawings of pumping and distribution systems are included. For more information write Layne & Bowler Pump Co., 2943 Vail Avenue, Los Angeles 22, California or check the reply card.

What You Should Know About The Centriline Process

197. The Centriline method for cement mortar lining water mains 16" thru 144" in place to stop leaks, prevent corrosion, increase carrying capacity and decrease pumping costs is fully described in a handsome booklet issued by the Centriline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical of this process. The Tate process for lining case histories show the operation and economies smaller mains is also covered.

Helpful Booklet on Carryable Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Requirements are outlined for many applications. Check the reply card for your copy. Homelite Div. of Textron Inc., 2125 Riverdale Ave., Port Chester, N. Y.

Helpful Reference Catalog on Waterworks Gate Valves

146. All necessary details on Double Disc Parallel Seat Gate Valves for waterworks use are provided in the attractive 36-page bulletin issued by Ludlow Valve Mfg. Co., Inc., Troy, N. Y. Conveniently arranged design data shows all dimensions for 2" to 60" valves. Gearing, floor stands, operating devices are covered too. Get Bulletin 54W by checking the reply card.

Data Offered on Elevated Steel Tanks

166. Attractive designs for elevated steel water storage tanks are shown in bulletins of R. D. Cole Mfg. Co., Newman, Georgia. For copies of latest literature check reply card.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletins for engineering data, diagrams of typical installations and details of component parts. Check the reply card or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy.

To order these helpful booklets check the reply card inside front cover.

New capacity!

The completely new Forward Control 'Jeep' FC-150—the first time a 4-wheel-drive Truck has so effectively combined maximum cargo capacity with exceptional maneuverability! New Forward Control design puts a 74" pickup box on an 81" wheelbase. And the FC-150 retains famous 'Jeep' ruggedness and versatility.

New maneuverability!

It's the world's shortest turning 4-wheel-drive Truck! For safer off-road maneuverability, it gives you up to 200% greater forward visibility. Powered by the engine that made 'Jeep' vehicles famous, the new FC-150 provides the extra traction of 4-wheel drive for off-road travel, shifts into 2-wheel drive for highway travel.

New style!

The new look and feel of tomorrow! The FC-150's Safety-View Cab combines beauty with utility. Its new wrap-around windshield is the largest in the 5,000 GVW class. There's plenty of extra leg and head room. Here is new styling, comfort, convenience and safety all in today's most advanced 4-wheel-drive Truck.

New 'Jeep' 4-Wheel-Drive Forward Control FC-150

Willys...world's largest makers of 4-Wheel-Drive vehicles

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Universal 'Jeep' | 'Jeep' Truck | 'Jeep' Utility Wagon

See 'Jeep' vehicles at your WILLYS dealer

To order these helpful booklets check the reply card inside front cover.

Engineering Data on Tilting Disc Check Valves

196. The Chapman tilting disc check valve is designed to lift away from the body seat without sliding or wearing; closes without slamming. Operating principles, details of construction, dimensions, recommendations and engineering data are fully covered in 18-page Bulletin No. 30. Get your copy by checking the reply card or write to Chapman Valve Mfg. Co., Indian Orchard, Mass.

Valuable Information on Water And Waste Treatment Instrumentation

229. Helpful data on pneumatic instrumentation, flow measurement, recording controllers and rapid sand filter control systems are included in a 16-page Bulletin 1-15. Get this from the Foxboro Co., Foxboro, Mass., or by checking the handy reply card.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the reply card or write F. B. Leopold Co., Inc., Dept. PW., 227 So. Division St., Zelienople, Pa.

Attractive Bulletin Features Large Elevated Tanks

252. In a 24-page booklet "Horton Elevated Steel Tanks of Large Capacity," Chicago Bridge & Iron Co., Chicago 4, Ill., describes the advantages of using large elevated steel tanks to provide gravity pressure in municipal water systems. Detailed information on radial-cone tanks of 500,000 to 3,000,000-gal. capacity and Hortonspheroidal tanks of 1,000,000 to 3,000,000 gal. is included in this really handsome bulletin. Check reply card for your copy.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in convenient booklets offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the reply card.

Review of Diatomite Filtration of Water

285. A detailed review of the application of diatomite in the general field of water filtration, including uses in municipal supply and swimming pools is contained in a well-prepared 16-page bulletin. Specific applications to certain water treatment problems are also discussed. Write to the Dicalite Division, 612 So. Flower St., Los Angeles 17, Calif. for Bulletin F-552 entitled, "Diatomite Filtration of Potable Water," or check the reply card.

Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check reply card for your copy.

Use The Reply Card

Helpful Data on Water Meters

330. It is to the interest of every water works superintendent and engineer to have full data on dependable Badger water meters and related meter products. Complete data on all types of disc, turbine and compound meters, meter test equipment, yokes, strainers and alarm registers are supplied in an attractive binder by Badger Meter Mfg. Co., Milwaukee 45, Wisconsin.

Points to Consider in Filter Sand Selection

332. Best operation of rapid sand filters requires filter media which is hard, properly shaped, carefully graded and perfectly clean. Filter sand and gravel which meets these exacting requirements is available on short notice from Northern Gravel Company, Box 307, Muscatine, Iowa. Get full details by checking the reply card.

Diesel Engines For Municipal Power Needs

359. Dependable power for water supply or flood control pumping stations, stationary or portable electric plants and many other municipal needs can be provided by engines described in literature of the Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif. Get latest data by checking the reply card.

How Your Filter Washing Can Be Improved

368. More effective sand washing with elimination of mud balls and bed cracking with resultant longer filter runs are claimed for the Palmer Filter Red Agitator, described in bulletins issued by Palmer Filter Equipment Co., Erie, Pa. Check the reply card.

Here's Help for Laboratory Planning

369. A comprehensive laboratory planning guide that tells the engineer and designer how to obtain maximum space economy; utilize new and present facilities; and use functional design in locating utilities, ventilation and lighting is now available from Metalab Equipment Co., Hicksville, L. I., N. Y. Complete data includes sectional and interchangeable lab equipment, furniture and accessories. Check the reply card for this valuable planning aid.

Book Tells How to Control Algae

371. Details on the control of various microscopic organisms frequently found in water supplies are furnished in a 44-page booklet offered by Phelps Dodge Refining Co., 300 Park Ave., New York 22, N. Y. Check the reply card.

What You Should Know About Hypochlorination

395. "Hypochlorination of Water" is the name of an informative publication issued by Olin Mathieson Chemical Corp., Industrial Chemicals Div., Baltimore 3, Md. In it there is a discussion of chlorination theory, practice and equipment; control of algae, tastes and odors; and laboratory testing. Check the reply card for this interesting literature.

To order these helpful booklets check the reply card inside front cover.

To order these helpful booklets check the reply card inside front cover.

Water Treatment For the Small Municipality

348. This bulletin is of special interest to the engineers of small municipalities. A review of the problem of municipal water supply is discussed along with the design of a water treatment plant and the conventional treatment methods. For your copy write General Filter Co., Ames, Ia., or check the handy reply card.

Diatomite Filters in Water Filtration

596. A new line of IWF diatomite filters is featured in this 10-page Bulletin 651 by the R. P. Adams Co., Inc., 328 East Park Drive, Buffalo 17, N. Y. The IWF is ideal for medium and small town water supplies and the bulletin provides installation drawings, sectional views and operational sketches. Check the reply card for your copy of this helpful bulletin.

Cleaning and Relining Water Pipe the Easy Way

397. Complete facilities for relining cast iron or steel water pipe lines in place from 4" to 144" in diameter, with both the Tate process and the Centriline process offered by Pipe Linings, Inc., 2414 E. 223rd St., Wilmington, Calif. For full information on cleaning and relining pipe with only momentary interruption of service, check the reply card.

Helpful Data on Swimming Pools

422. Complete data on McWane Super-DeLavaud centrifugally cast pipe with bell and spigot or mechanical joints is contained in Bulletin WP-54, issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala. Size range includes 2" through 12" diameters, 18 feet long.

Important Factors in Water Meter Selection

463. Interchangeability of parts is an important advantage that is yours when you use Trident meters. The newest parts fit your oldest Tridents so you modernize when you repair. Get full data on the entire Trident water meter line by checking the reply card or write to Neptune Meter Co., 19 West 50th St., New York 20, N. Y.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833-A. Detailed information is provided on bar screens, grinders, grit collectors, "Jgrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use card or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

Bulletin Helps Specify A.W.W.A., Gate Valves

547. Double disc gate valves in 2" to 60" sizes are fully described in a 16-page bulletin which gives details on valve parts, design, materials, application of the "O" Ring Seal, operation and operating devices, directions for ordering valves and parts, dimensions of all sizes, and descriptions of eleven different methods for end connections. Valves for horizontal operation, square bottom valves, many types of gearing and gear cases, and a complete listing of special controls available are included. Get Bulletin A from Rensselaer Valve Co., Troy, N. Y. by checking the reply card.

Pressure Filters and Accessories for Water Treatment

573. Type "F" vertical and Type "E" horizontal pressure sand and gravel pressure filters for water treatment are described in detail in a 15-page bulletin. The Permutit multiport valve, automatic controls, rate-of-flow indicators and other accessories are also covered. Specifications are outlined. Bulletin 2225-B is available from the Permutit Co., 330 West 42nd St., New York 36, N. Y., or by checking the reply card.

Manhole, Water or Gas Valve Box Locator

603. A valve box locator or manhole finder is available from Aqua Survey & Instrument Co., 2012 Leslie Ave., Cincinnati 12, Ohio. Rugged and compact with no wires, batteries or switches, the Aqua box locator should be in every service car. For more information and price, check the reply card.

SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay under drain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 200 So. Broad St., Ridgewood, N. J. Check the reply card and we will forward your request.

Water Level Controls for Sewage and Water Plants

31. Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Ruff Co., 719 Hampden Ave., St. Paul 14, Minn. All units feature splash proof construction, mercury tube switches.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 48-page booklet issued by Flexible Inc., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included.

Mechanical Joint Principle Applied to Sewer Pipe

101. The Amvit joint forms a tight compression seal between bell and spigot rings, prevents infiltration and stops root intrusion. Get data on Amvit jointed vitrified clay pipe from American Vitrified Products Co., Cleveland, Ohio. Check the reply card.

To order these helpful booklets check the reply card inside front cover.

To order these helpful booklets check the reply card inside front cover.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet to made on business letterhead.

Data Offered on Water, Sewage and Waste Treatment Equipment

263. Equipment for sewage treatment, water purification and industrial waste treatment is described in a 16-page Book No. 2440, published by Link-Belt Co., Colmar, Pa. Case histories, photographs and schematic drawings are included. Straightline and Circuline collectors, Thru-Clean and Straightline bar screens, Tritor screens, flash mixers, scum breakers and other units are described.

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflow" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317 B-12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the reply card.

Complete Story of Rubber as a Coupling Medium in Pipelines

295. "Joint Enterprise", a booklet describing Tylox rubber joints for coupling pipe used in sewerage, drainage and waterworks projects is now available from Hamilton Kent Manufacturing Co, 7 West Grant St., Kent, Ohio. The booklet also contains illustrated case histories of Tylox-Jointed installations, and suggestions to assist engineer in specifying Tylox joints for both tongue and groove, and bell and spigot pipe. Check the reply card.

Complete Information and Installation Data on Clay Pipe

225. A fully illustrated bulletin containing complete data on vitrified clay pipe with pre-assembled Tylox flexible couplings has just been released by Univeraal Sewer Pipe Corporation, 1500 Union Commerce Building, Cleveland 14, Ohio Complete information on Universal's rubber, neoprene and polyvinyl chloride resin types of Tylox couplings is included. Check the reply card today.

Catalog on Sewage Gas Meters, Regulators and Valves

245. A handy catalog on sewage gas meters, regulators and valves is available from Rockwell Mfg. Co., Pittsburgh 8, Pa., also included are data on lubricants and accessories, power and remote operation, semi-steel valves and multiport valves. Check the reply card.

Valuable Information on Underground Pumping Stations

246. The complete prefabricated underground pumping station is fully described in a bulletin just released by Zimmer & Francescon, 1715 Fifteenth Street Place, Moline, Ill. Construction features, corrosion control, electric controls, specifications, pumping equipment and installation are a few of the items covered. Check the reply card.

How and Where to Install A Septic Tank System

270. A manual on modern sewage disposal methods for individual dwellings, camps and rural schools has just been released by Brown Co., 150 Causeway St., Boston, Mass. Location, size of and building the tank, how large a disposal field and laying out the field are discussed. Check the reply card today.

For Prompt Service Use The Reply Card

Digester Capacity Requirements Are Substantially Reduced

284. A 16-page, two-color bulletin, "The Dorrco Densludge Digestion System" is now available from the Dorr-Oliver, Inc., Barry Place, Stamford, Conn. Describes the development, equipment, operation, typical applications and design loadings of this new sludge digestion system. Explains how digester capacity requirements are substantially reduced. Included are wash and line drawings and photographs of the various equipment units. Check the reply card.

Dependable Standby Power For Water Pumping

342. The use of LeRoi generator sets for dependable low-cost standby power is discussed in an attractive bulletin, No. G-6, issued by LeRoi Div. Westinghouse Air Brake Co., Milwaukee 14, Wis. Detailed specifications are included. Check the reply card for your copy.

Getting Improved Sludge Dewatering With Non-Clogging Vacuum Filters

425. Latest information on the Komline-Sanderson "Coilfilter," which features non-clogging, permanent filter media to obtain constant output and low operating cost is presented in illustrated Bulletin No. 102 by the Komline-Sanderson Engineering Corp., Peapack, N. J. Be sure to investigate this improved method of sludge dewatering. Check the reply card today.

Underground Pumping Stations, Complete Package Units

522. Pre-fabricated automatic underground pumping stations that are completely assembled for quick, economical installation are described fully in literature available from Schmieg Industries, Inc., Pumping Station Div., 23930 Sherwood, Center Line, Mich. Generous access space between pumps and accessible sump pump location are a few features.

V-Notch Chlorinators For Water and Sewage Plants

590. Bulletins on the Series A-711 and the Series A-712 chlorinators are available from Wallace & Tiernan Inc., Box 178, Newark, N. J. Covered in the literature are design features that include operation, installation and maintenance. Simplified flow diagrams in color are included showing the operation of the units. Class, capacities, feed ranges and electrical requirements are described in the technical data section. For your copies, check the reply card.

To order these helpful booklets check the reply card inside front cover.

To order these helpful booklets check the reply card inside front cover.

Combat Unpleasant Odors At Municipal Sanitation Sites

404. Malodors at municipal refuse disposal sites, waste treatment plants and incinerators may be effectively "neutralized" by the odor masking products of Rhodia, Inc. Be sure to investigate this means of eliminating complaints from unpleasant odors. Write Rhodia, Inc., 60 East 56th St., New York 17, N. Y. or check the reply card.

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CONSTRUCTION EQUIPMENT AND MATERIALS

A Fully Rotary Compressor by Jaeger

209. Complete information is available from The Jaeger Machine Co., Columbus 16, Ohio on this 2-stage, oil-cooled rotary compressor. Features include 80% fewer moving parts, up to 30% less weight, vibrationless operation and 100° cooler air. For full details check the reply card.

Davis Back-Hoe and Davis Loader

312. Literature is available from Mid-Western Industries, Inc., 1009 S. West St., Wichita, Kans., describing the new Davis back-hoe and Davis loader. The back-hoe can dig at right angles and to a depth of 13 ft. and detaches in 5 minutes. Both units are available for most popular makes of tractors.

New Traxcavators For New Profits

592. This 8-page booklet explains how Caterpillar's three new Traxcavators, the No. 933, No. 955, and No. 977, have been designed and built to deliver higher production over a longer period. Performance factors such as stability, bucket capacity, power and speed are discussed. Check the reply card or write Caterpillar Tractor Co., Peoria, Ill., for your copy.

Better Paving On Small Jobs

176. Blaw-Knox Company's small-job paving machine, the Adnun Jr. 8, is the subject of bulletin No. 2609. The Adnum Jr. is equipped with a 12-HP motor. Hopper capacity is approximately 2 tons. It will pave an 8-ft. strip. For full engineering details and on-the-job performance data, get this bulletin from Construction Equipment Div., Blaw-Knox Co., Mattoon, Illinois. Check the reply card.

Information on "Bondactors" Concrete Gunning Machines

282. The "Bondactors" are concrete gunning machines that are capable of gunning cementitious aggregates by means of compressed air at a greater density, stronger bond and longer-lasting surface. Full details on models, specifications, accessories and extra accessories are included. Examples of these machines being used for waterproofing, concrete restoration, stuccoing, building cleaning and fireproofing are shown. For your literature send to Air Placement Equipment Co., 1009 W. 24th St., Kansas City 8, Mo., or check the handy reply card.

Sherman Power Digger For Digging in Any Soil

493. Sherman Major power digger literature is now available, providing details on this new hydraulic backhoe designed specifically for attachment to Fordson-Major tractors. The unit can dig to a depth of 12½ ft. and can dig through a 180° arc of swing and to a loading height of 8 ft. 8 in. Specifications and operation are fully covered. The 8-page colored catalog can be obtained from Sherman Products, Inc., 3200 West 14 Mile Road, Royal Oak, Mich., or by checking the handy reply card.

Tracto-Loaders For Fast Material Handling and Excavating

600. Tracto-Loaders with capacities from ½ cu. yd. to 1½ cu. yd. are described fully, in a 2-color catalog available from Tractomotive Corp., Deerfield, Ill. General purpose material handling and excavating loading in confined areas are jobs performed by these machines. Check the reply card.

Useful Attachments for "Payloader" Tractor Shovels

95. Increased versatility for Hough "Payloader" tractor shovels is made possible by the various attachments described in literature of the Frank G. Hough Co., 761 Seventh St., Libertyville, Ill. Illustrated and described are rotary "V" and trip-blade snow plows, hydraulic backhoe, back-filler blade, pickup sweeper, scarifier teeth, winches, etc. Check the reply card today and full details will be sent.

IHC Crawler Tractors For Highway Construction

491. Information on the new International TD-6, TD-9, TD-14 and TD-18 diesel crawler tractors is contained in 8-page, 2-color booklets available from Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Mechanical features and specifications, engine power, and operation are fully covered. Check the reply card.

Use The Reply Card

Dozers For IHC, Ford and Fordson Major Tractors

501. Rugged and economical dozer blades for the IHC 300, Ford 600 and 80, and for Fordson Major tractors are described fully in literature available from Arps Corp., New Holstein, Wis. Blades are 4, 5 and 6 ft. long and are ideal for landscaping, backfilling, leveling, snow plowing and grading. Check the reply card today.

Agent For Improving Adhesion Between Old and New Concrete

530. Thorobond liquid bonding agent for improving adhesion of new concrete to old concrete walls, floors and ceilings is described in literature available from Standard Dry Wall Products, Inc., New Eagle, Pa. Check the reply card for information on typical uses and methods of application.

To order these helpful booklets check the reply card inside front cover.

STREETS AND HIGHWAYS

How to Select Prestressed Concrete Bridge Members

26. Colorful folder, well illustrated, shows manufacture of "Amdek" prestressed bridge members and provides selection tables covering several AASHO loadings. Full data from Concrete Products Div., American Marietta Co., 104 East Ontario St., Chicago 11, Ill. Check the reply card for your copy of this helpful reference bulletin.

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the reply card.

Literature on the Four-Wheel Drive Jeep Truck

144. The FC-150, "Forward Control" Jeep truck is described fully in literature available from Willys Motors, Inc., Toledo 1, Ohio. A few engineering features are 81-inch wheelbase, 18-ft. turning radius, 9 forward and 3 reverse power combinations and four-wheel drive. For complete specifications check the reply card.

Center Mounted Grader Blades For Utility Tractors

302. Grader blades that can be center mounted on most makes of utility tractors are described in literature available from J. R. Prewitt & Sons, Pleasant Hill, Mo. Units are ideal for road maintenance, shoulder work, landscaping and snow removal. Check the reply card.

1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy reply card for full data. Ernest Holmes Co., Chattanooga, Tenn.

How to Solve the Brush Disposal Problem

277. Fitchburg Chippers, engineered to solve the brush disposal problem reduce troublesome brush and trimmings to tiny, easy to-dispose-of chips. Several models are available to meet your needs. May be mounted on truck body or on trailer, tractor or jeep. Full details in interesting, profusely illustrated 16 page bulletin. Write Fitchburg Engineering Corp., Fitchburg, Mass., or check the reply card for your copy.

Continuous Concrete Bridges

416. A 106-page catalog published by the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill., is a working text giving a complete procedure for design of continuous bridges, from layout to final analysis. Applicable for highway or railroad loading, the catalog includes a procedure for determination of deflections and curves to reduce the labor of computing deflections of multiple-span structures. Check the reply card today.

Manual on Apparatus For Tests of Soils, Concrete and Asphalt Materials

518. The new 128-page catalog released by Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill., contains descriptions and illustrations of over 1350 items of apparatus for engineering tests of soils, concrete, asphalt and construction materials. It lists items ranging from pocket penetrometers for soil, to pavement deflector instruments for asphalt, and 200,000 pound compression testing machines for concrete. Check the reply card today.

What You Should Know About Soil Sampling

255. Acker Soil Sampling Catalog No. 25 contains a complete and thorough collection of information about soil sampling in all types of sub-surface conditions. Modern sampling techniques are discussed together with recommendations as to tools and accessories. Write Acker Drill Co., Inc., Scranton, Pa., or check the reply card.

Sign Catalog Has Latest Specifications

417. Detailed information on all classifications of standard signs for traffic control, street identification and other purposes together with a complete line of accessories is presented in a convenient Sign Manual by Lyle Signs, Inc., 2731 University Ave. S. E., Minneapolis 14, Minn. Get Catalog B-55 for most recent data and specifications on U. S. Standard signs.

The Trucks You Need for Every Public Works Job

461. Extra life and operating economies are built-in features of every Ford truck model. There's a chassis size and engine for each of your needs, from light utility work to heavy-duty construction jobs. Get latest literature from Ford Motor Co., Truck Div., Dearborn, Mich., by checking the reply card.

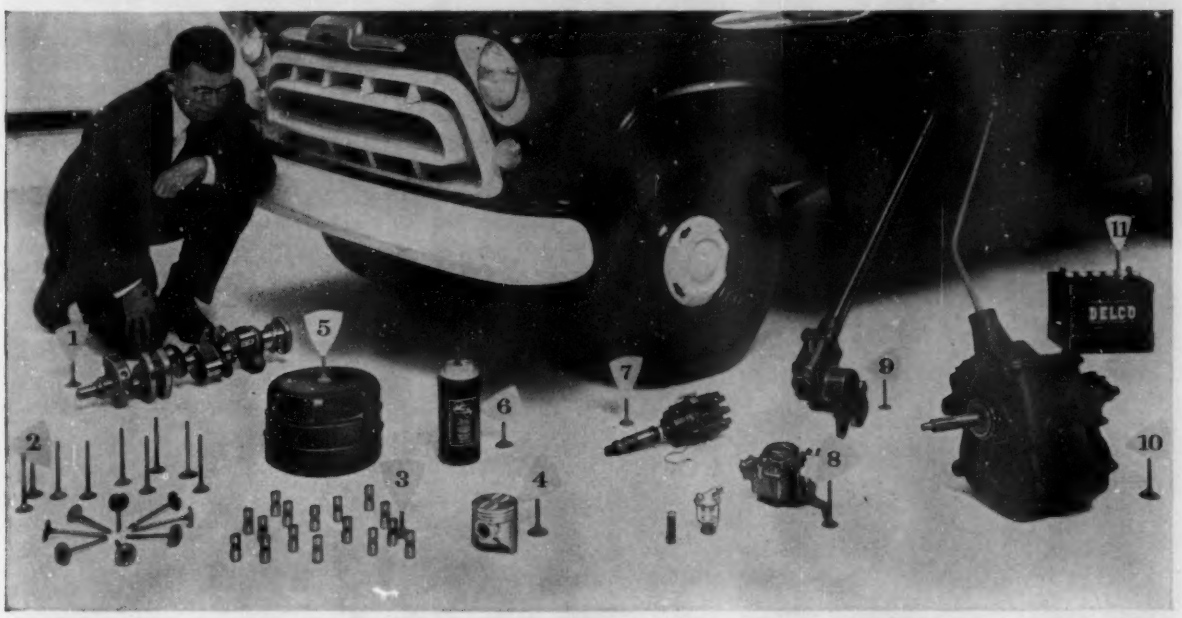
Tractors and Equipment for Municipal Use

407. Specifications for the John Deere crawler and utility wheel tractors, together with equipment for loading, dozing, mowing, sweeping and many other operations is covered in a comprehensive illustrated catalog issued by John Deere, Dept. 66B, Moline, Ill. Get your copy by checking the reply card.

Survey Marking and Identification Equipment

691. Surveyor stakes, identification caps and monument markers are described fully in literature available from Bathey Mfg. Co., Plymouth, Mich. Price schedules and descriptions are included. Check the reply card today.

LOW HAULING COSTS COME RIGHT FROM THE "HEART" OF A '57 CHEVY



Many of the things that make a Chevrolet truck more economical to run are seldom seen by the owner. They're hidden features, deep in the truck's design. Here are just a few of them, to prove a Chevy's engineered better and built better for bigger savings!

1. *Forged steel crankshaft*—It's extra sturdy, precision machined and balanced, the foundation for dependable, long-lasting power!

2. *Aldipped exhaust valves**—Special aluminum treatment on valve surface protects valves against pitting; engine wears less, costs you less to run!

3. *Hydraulic valve lifters*—for longer valve life in V8's, fewer engine repair jobs.

4. *Chevy V8 piston*—Thanks to *short-stroke* V8 engine design, this piston travels a shorter distance, wears less. Short-stroke efficiency aids fuel economy, too!

5. *Oil-bath air cleaner—standard* on all Chevrolet truck engines for added protection against dust and foreign matter that shorten engine life.

6. *High-capacity oil filters***—They remove dirt particles from Chevy engine oil to cut engine wear and maintenance.

7. *Easy-adjust distributor points*—You can adjust this new Chevy V8 distributor *with the engine running*; it's added insurance against costly down time.

8. *Multiple fuel filters*—For *clean* fuel, all Chevy engines have fuel filters in the carburetor and fuel tank; in addition, V8's provide an *extra* filter at the carburetor.

9. *Ball-Gear steering mechanism*—Inside this steering gear scores of polished steel balls virtually eliminate friction. Less friction means less wear, less maintenance!

10. *Rugged manual transmission*—Synchro-Mesh design eliminates the need for double-clutching, reduces costly wear. Gears are shot-peened for extra strength.

11. *12-volt battery*—provides sure starting, good ignition, long battery life in all Chevrolet trucks.

And there are many more! See your Chevrolet dealer for all the dollar-saving facts. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**On Thriftmaster 6, Trademaster V8.*
***Standard on V8's and Jobmaster, optional on Thriftmaster 6.*

1957 CHEVROLET TASK·FORCE TRUCKS

PROVED ON THE ALCAN HIGHWAY . . . CHAMPS OF EVERY WEIGHT CLASS! CHEVROLET

To order these helpful booklets check the reply card inside front cover.

Easy Reference on Durable Gratings and Treads

90. An easy-to-use catalog containing illustrations, descriptions and complete engineering data on grating-flooring, treads and floor armoring of riveted, press-locked and welded types has been published by Irving Subway Grating Co., Inc., 50-53—27th St., Long Island City, N. Y. To get this useful reference write to the manufacturer and ask for Catalog F400 or check the handy reply card.

Sidecrane-Backfiller-Tamper, A Versatile 3-Way Machine

125. A 3-way machine, the Cleveland 80W, that is a backfiller, sidecrane and tamper is described fully in a 12-page Bulletin, No. L-102, available from The Cleveland Trencher Co., 20100 St. Clair Ave., Cleveland 17, Ohio. Design and construction features, photographs of the machine in operation and complete dimensions and specifications are covered. Check the reply card.

How the Mobil-Sweeper Can Improve Street Sweeping

305. Sweeping costs can be cut with the Mobil-Sweeper which features safe highway speeds up to 55 mph, carries 2 2/3 cu yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no abstacle. Write to the Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use reply card for complete details on this machine.

Heavy-Duty 3-Axle Tandem Roller

339. Complete specifications on the 13-20 ton Buffalo-Springfield 3-axle Walking-Beam tadem roller are covered in a 12-page Bulletin S-71-1255. The Walking-Beam consists of a beam from which are suspended an end guide roll and center guide roll and the beam is center-pivoted to move in a vertical arc. For complete details write Buffalo-Springfield Co., Springfield, Ohio, or check the reply card.

Monotube Overhead Sign Supports For Highway Marking

567. Monotube overhead sign supports for freeways, turnpikes, expressways and general highway use are described fully in catalog available from the Union Meta! Mfg. Co., Canton 5, Ohio. The catalog describes in detail both double and single post designs, including assembly and installation details, dimensional data and some of the possible variations. Plenty of photographs and drawings are included. Check the reply card for your copy today.

Literature on 1957 Chevrolet Utility and Maintenance Trucks

579. Light and medium duty 1957 Chevrolet trucks are described fully in literature available from Chevrolet Div. of General Motors, Detroit 2, Mich. New features include modern versions of Thriftmaster and Jobmaster 6's and the short-stroke Trademaster V8's and the 283 cu. in. Taskmaster V8's. Also optional features are the Hydra-Matic and Powermatic transmissions. Check the reply card.

Vacuum Cleaner and Leaf Collector For Cleaner Streets

595. A unit is now available that can be mounted on a right-hand drive jeep or a pick-up truck for picking up gutter trash and leaves. Complete specifications, capacity, operation and installation procedures are covered in a bulletin available from Tarrant Mfg. Co., Saratoga Springs, N. Y., or can be obtained by checking the reply card.

●

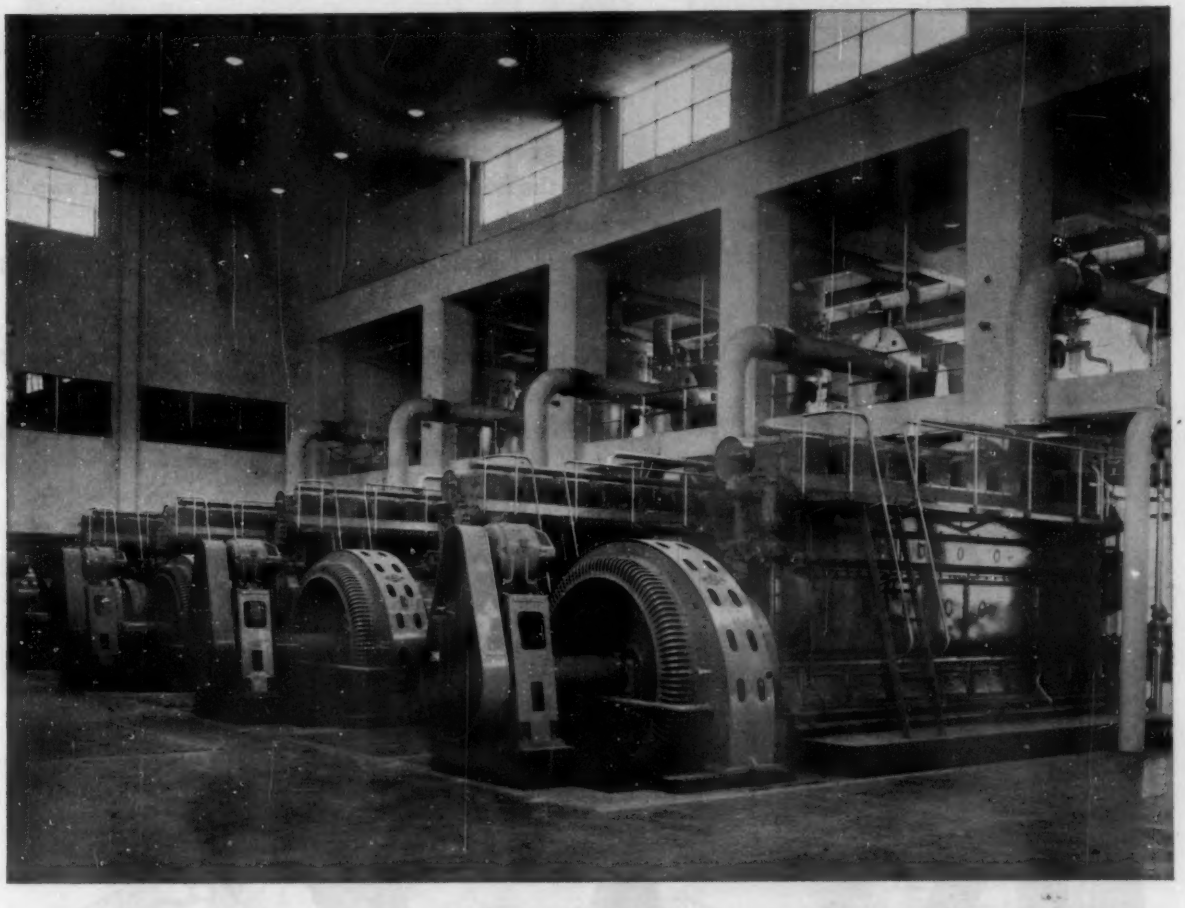
WEED AND DUST CONTROL

How to Cut Weed Control Costs

308. Information on a weed killer that can save hundreds of man-hours of clearing and cutting is available from Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio. Whether you want to control weeds or brush or both, without damage to crops or ornamentals, get this literature today by checking the reply card.

(*Continued on page 52*)

"One of the most outstanding operational records in sewage treatment and engine operation" reports Diesel Progress about the Hyperion Activated Sludge Plant of the City of Los Angeles.



10 Worthington engines chalk up 293,899 hours and not one ring, liner, or bearing wore out!

ENGINE	OPERATING HOURS
No. 1	28,928
No. 2	31,163
No. 3	26,926
No. 4	30,422
No. 5	25,648
No. 6	34,472
No. 7	38,367
No. 8	33,785
No. 9	33,753
No. 10*	10,435

*Installed Oct., 1954

In six years of operation, the nine original Worthington engines averaged over 31,000 hours each.

Operating on methane produced in Hyperion's digestion facility, the Worthington engines are turbocharged dual-fuel units rated at 1688 hp each. In six years the ten engines have run 293,899 hours without wearing out a piston ring, cylinder liner, or bearing.

No. 7 Good for 100,000 Hours

Engine No. 7, first on the line, is typical. This engine has 38,367 hours on its original rings. After a routine overhaul, Hyperion engineers predicted a life of 100,000 hours —equivalent to 11 years of continuous operation—per set of rings. They expect double this life for the cylinder liners.

Good Operation

Of course, the finest piece of equipment would not give such an outstanding record without careful attention to such items as lubrication, clean fuel, temperature control, etc. Good operation is the watchword at Hyperion and annual overhauls, including checking of all operating parts, back up the high quality of the Worthington equipment.

Full Report Available

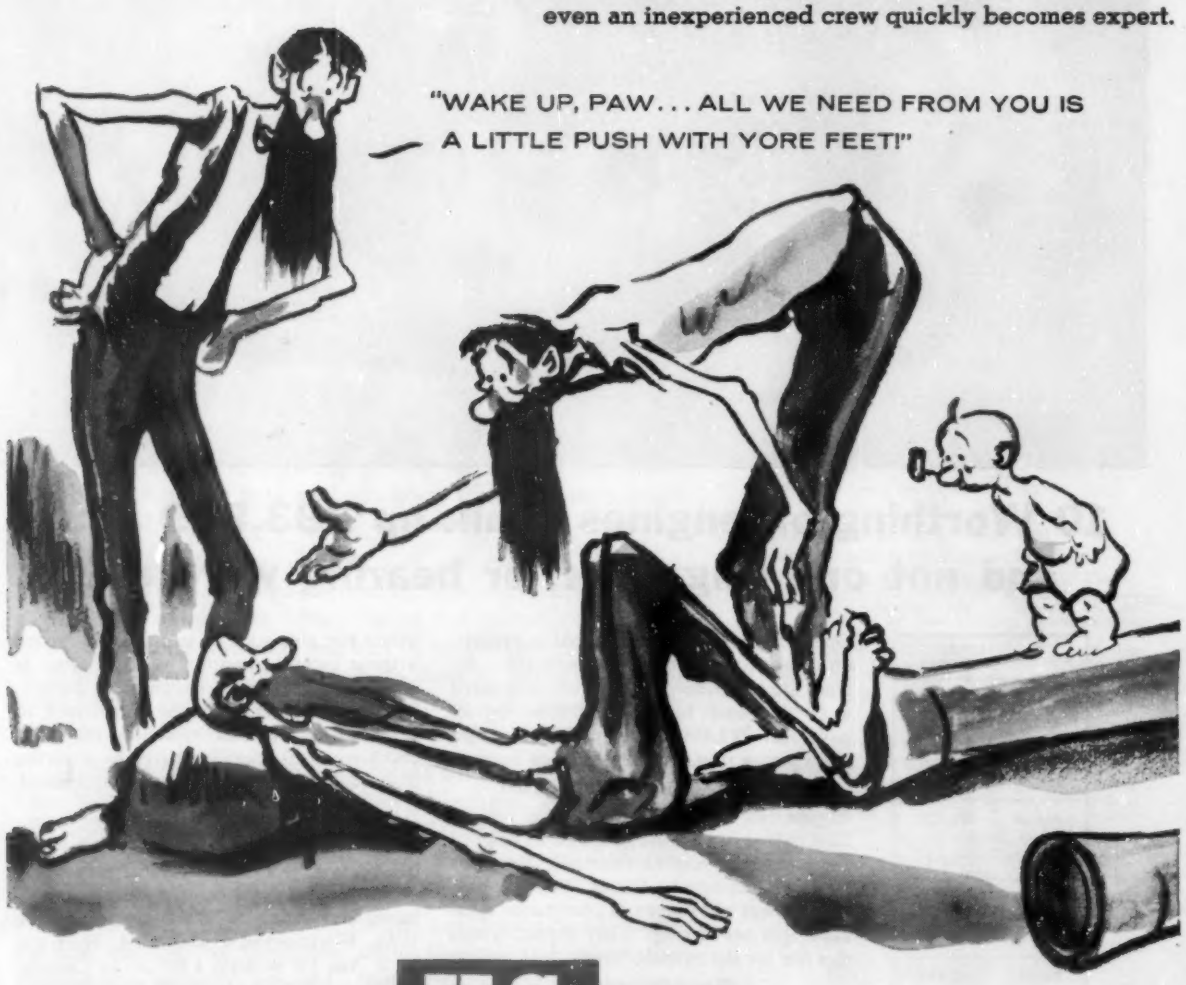
If you would like a reprint of "Hyperion's Six Years of Operation," an interesting article about the plant and its many maintenance innovations, please write to Section W63, Worthington Corporation, Harrison, N. J. Ask for Bulletin RP-928. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont. W.6.3

WORTHINGTON

a cinch to

Tyton Joint pipe is *quite* as easy to install as our hillbilly friend indicates. Only one accessory needed ...a specially designed rubber gasket that fits into the bell of the receiving pipe. A push or two and the connecting pipe compresses the gasket...seals the joint bottle-tight and permanently.

No bell holes. No waiting for weather. "Tyton" can be laid in rain or wet trench. It's so simple, in fact, even an inexperienced crew quickly becomes expert.



U.S. PIPE FOR WATER, SEWERAGE AND

install!

You'll be hearing more about this ingenious new Tyton Joint. Why not get the facts firsthand...and now?

Write or call. We'll be glad to give them to you.

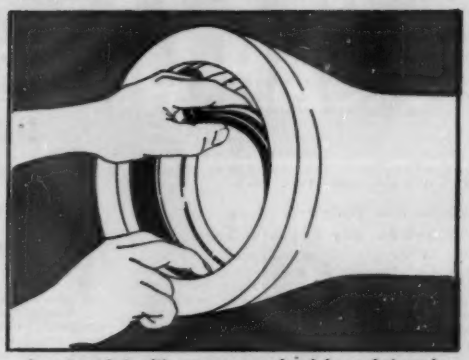
U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE

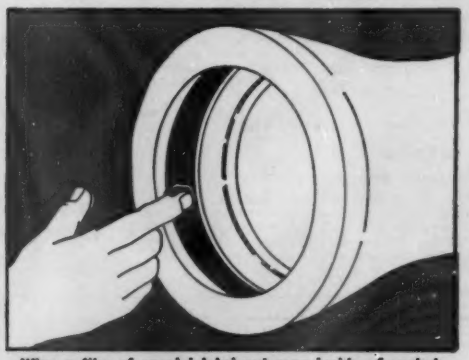
INDUSTRIAL SERVICE CAST IRON

U. S. TYTON JOINT

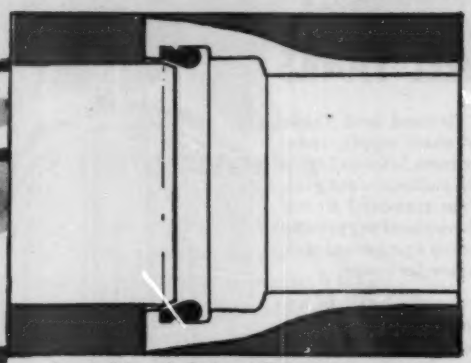
ONLY FOUR SIMPLE ACTIONS



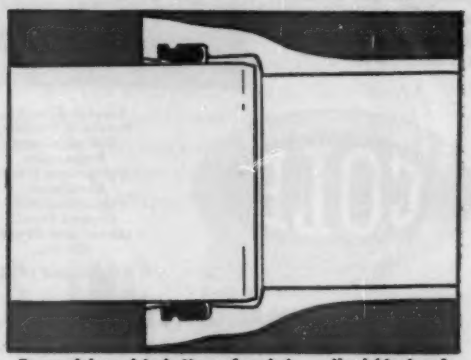
Insert gasket with groove over bead in gasket seat



Wipe a film of special lubricant over inside of gasket



Insert plain end of pipe until it contacts gasket



Force plain end to bottom of socket . . . the job's done!

To order these helpful booklets check the reply card inside front cover.

SNOW AND ICE CONTROL

Calcium Chloride for Various Municipal Uses

157. A booklet on calcium chloride discussing its use in dust and ice control, dehumidification, refrigeration brine, concrete curing, dust-proofing coal and surface consolidation is available from Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pa. Photographs and tables are included. Check the handy reply card.

Reversible and Roll-Over Type Snow Plows for any Depth of Snow

389. Village, city, county, state and airport officials send for the latest information on Frink's two catalogues on reversible trip-blade and roll-over snow plows. Complete assembly details, specifications and operation are completely outlined. Write to Frink Sno-Plows, Inc., Clayton, Thousand Islands, New York, or check the reply card for the catalogues.

Ice Control Without Corrosion Dangers

439. Virtually all corrosion is prevented when rust inhibitor "Banox" is used in conjunction with salt for snow and ice control. Properties of this material and performance results are described in bulletins issued by Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa. Check reply card for your copies.

How to Make Icy Surfaces Safe

455. A bulletin on how calcium chloride works in ice control and directions for its use has been made available by Wyandotte Chemicals Corp., Wyandotte, Michigan. Other uses of calcium chloride are fully outlined. Check the reply card.

Spreading Equipment For Ice Control

543. An ice control catalog describing the full line of Baughman ice control spreading equipment has been released by Baughman Mfg. Co., Jerseyville, Ill. Included are illustrations and descriptions of truck-mounted spreader bodies, tail gate spreaders, dump body and pull type spreaders and gravity feed spreaders. For your copy of this helpful and interesting booklet check the reply card today.

STREET LIGHTING AND TRAFFIC CONTROL

Investigate These Street Lighting Standards

54. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards, brackets and mast arms by using the handy reply card. Check these strong, well designed, inexpensive steel standards for practical street and highway lighting. Handsome 26-page folder includes data sheets on floodlighting and area lighting applications. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

Information on Aluminum Lighting Equipment

296. Aluminum standards, brackets and lighting equipment are described fully in a catalog No. HAL-754 available from Hubbard Aluminum Products Co., Division of Hubbard and Co., Pittsburgh 1, Pa. Check the reply card today for information on poles designed for every outdoor lighting application.

PR System of Coordinated Traffic Signal Control

589. This bulletin describes the PR local controller which carries out the directions of the Electro-Matic Master in the all-electronic equipment for coordinated traffic signal operation. Check the reply card or write Automatic Signal Div., Eastern Industries, Inc., Norwalk, Conn., for this valuable bulletin.

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy reply card today.

How New, Larger Load-Packer Cuts Refuse Collection Costs

51. Ever increasing problems in refuse collection work include longer hauls and higher costs of labor, chassis, operation and maintenance. As a solution, Gar Wood offers Load-Packers with dual-thrust compaction that gives big capacity on shorter wheelbase, plus safe, labor-saving operation. Profusely illustrated Form W-144 tells why you should investigate Load-Packers. Check reply card or write Gar Wood Industries, Inc., Wayne, Mich.

Complete Package Dravo Incinerator Plant

584. The Dravo incinerator includes receiving pits, automatic refuse handling system, automatic combustion controls, traveling grate stoker and everything necessary for the efficient operation of the plant with minimum personnel. Write for full information to Dravo Corp., Dravo Building, Pittsburgh 22, Pa., or check the reply card.

"SPEED-PACKERS CUT OUR COLLECTION COSTS IN HALF!"

. . . reports Samuel D. Lasseter, Jr., Commissioner of Public Works

"Five Speed-Packers and thirteen Load-Packers make up our refuse collection fleet," reports Samuel D. Lasseter, Jr., Gadsden, Alabama. "The two different types of bodies enable us to meet specific collection requirements. The efficiency of these units, and the proper application of them, cut our collection costs in half. With this saving we were able to improve service from once-a-week to twice-a-week schedules . . . actually with smaller collection crews than we used before!"

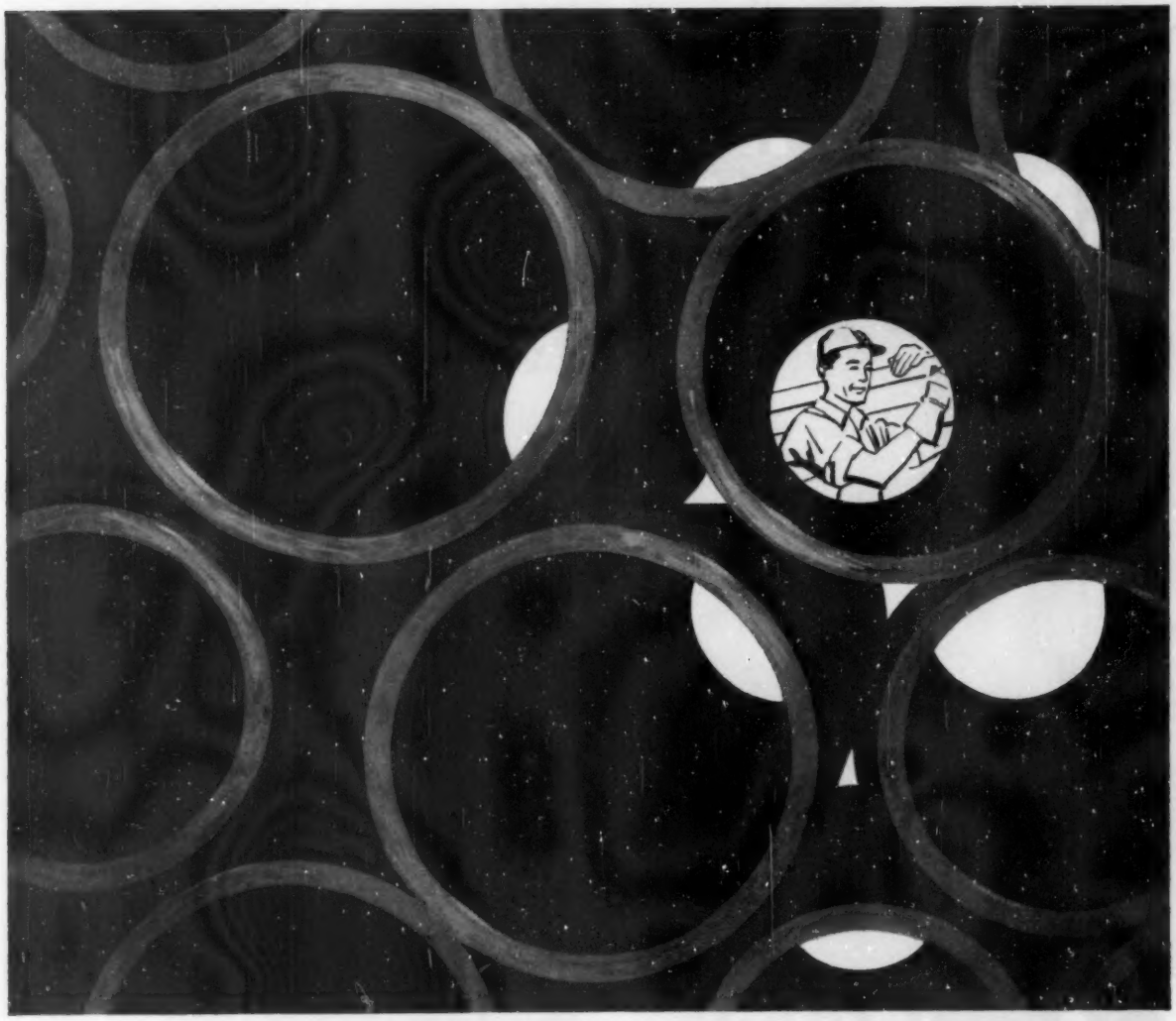
"Faster loading of the Speed-Packer has been an important factor," says Lasseter. "We find that the continuous cycle and lower, more efficient hopper design makes this the easiest-loading unit on the market. The fact that refuse is shredded before compaction gives the Speed-Packer almost unbelievable capacity. The number of trips to our landfill has been reduced by fifty percent. That gives us an extra two hours a day per truck for collection service!"

"Maintenance has been negligible," continues Lasseter. "Both Speed-Packers and Load-Packers have given us complete dependability." Learn more about the complete line of Gar Wood refuse collection equipment by contacting your Gar Wood-St. Paul truck equipment distributor. Or, write to Customer Service Dept., Gar Wood Industries, Inc., Wayne, Michigan.

GAR WOOD INDUSTRIES, INC.

Wayne, Michigan • Richmond, California

GarWood



Modern building codes include **BERMICO®** bituminized fibre pipe—*modern pipe for modern living*

Far-sighted code authorities everywhere are recognizing the advantages to their communities of modern, light-weight, root-proof Bermico Sewer Pipe—the dependable pipe *that comes in 8-foot lengths for easier installation.*

Already certified in communities all over the country and recently given the stamp of approval of the Southern Building Code Congress, Bermico is widely recognized today as the Modern Pipe for Modern Living.

Made of tough cellulose fibre impregnated with coal-tar pitch, it resists acids and alkalies, is strong, and stands up under temperature changes and soil settlement—for lasting protection against failure in sewer lines and drainage.

Available in all diameters from 2" to 6", Bermico is the only bituminized fibre pipe with a complete line of fittings—Wyes, Tees, and Bends—made of the same material. You can't buy and install root-proof pipe for less.

Your community will be grateful when you modernize your plumbing code to include Bermico, the modern pipe for modern living. Thousands already have. For technical information, write Dept. BE-2, Brown Company, 150 Causeway Street, Boston 14, Mass. *(Mills:* Berlin, Gorham, North Stratford, N. H.; Corvallis, Ore.)

BERMICO®
for house to sewer or septic tank

BERMISEPTIC®
for septic tank-disposal fields

Guarantee of Quality BPI BITUMINOUS PIPE INSTITUTE

HOLMES-OWEN TRUCK LOADER provides versatile while saving on such jobs as repaving, repairs and maintenance of streets, roads, parks, etc.

VERSATILE ONE MAN USE reduces cost of street cleaning, removal of debris, broken pavement, snow, hard deposits of washed-in dirt, trash, etc.

LOADER enables Truck Driver to speed-up loading and hauling of materials, thereby offering substantial savings in cost per ton handled.

The HOLMES-OWEN LOADER is hydraulically operated, lifts ½ yard per bucket, loads the average truck in 4 minutes and can be installed on most any 1½ to 2 Ton Truck. For full information see your equipment dealer or write factory direct.

Manufactured by

ERNEST HOLMES CO., Chattanooga, Tenn.

. . . . Invaluable as a WORK-SAVER on STREETS, ROADS and Numerous other operations

CUTS cost of many Jobs as much as 50%

Cities throughout the nation are today reducing the cost of street maintenance, handling of stockpile materials and many other operations with trucks that are equipped with a HOLMES-OWEN LOADER. The use of a truck loader speeds up hauling and loading, thereby assuring faster, more efficient work. It saves time, labor and equipment by permitting the truck driver to do light digging, grading, cleaning up and loading, without the need of additional manpower or the use of more costly equipment. A truck with such versatile one-man operation can easily do the work of several men, and as such, becomes a valuable asset in reducing today's high cost of operations.

Why can this PAYLOADER® ...handle more jobs?

Because many exclusive attachments make this PAYLOADER a multi-purpose unit. No other tractor-shovel, no other machine you can buy can serve in so many ways. It can be a back-hoe . . . a pick-up street sweeper . . . a scraper . . . a rotary snow plow . . . a clamshell . . . can take the place of many special machines in many cases. Add its many uses with regular bucket, its 4-wheel drive traction, its rubber tire mobility and you have a machine you can keep profitably busy all day long, that gets quickly to any place where it is needed and can pay its way every month of the year.

More than ever before you can get more tractor-shovel when you buy a 4-wheel-drive "PAYLOADER", because you get more tractor-shovel versatility. You get power-transfer differentials — an exclusive "PAYLOADER" feature that maintains effective traction on mud, gravel, ice and snow. You get no-stop power-shift transmissions and torque converters . . . planetary final drives . . . power steering and 4-wheel power brakes. You get the exclusive bucket motion with 40° tip-back and powerful pry-out action that enables them to dig more, carry more and deliver more . . . to outperform any comparable tractor-shovels. Your "PAYLOADER" Distributor is anxious to demonstrate what they can do for you.

Any Time
Any Place
Any Season

EXCLUSIVE! RAM twin-screw, self-powered rotary plow is an efficient, proven "PAYLOADER" attachment.

EXCLUSIVE! DROTT 4-in-1 buckets make a "PAYLOADER" a clamshell, a scraper, a shovel, a bulldozer.

EXCLUSIVE! RAM pick-up street sweeper has independently powered gutter broom . . . dumps its loads into trucks.

EXCLUSIVE! WAIN-ROY hydraulic back-hoe is attached and detached in a matter of minutes.

OTHER USEFUL ATTACHMENTS

"V" Snow Plows • Blade Snow Plows • Backfiller Blades
Log and Lumber Grapples • Scarifier Teeth • Crane Hooks
Fork Lifts • Land-clearing Blades • Winches

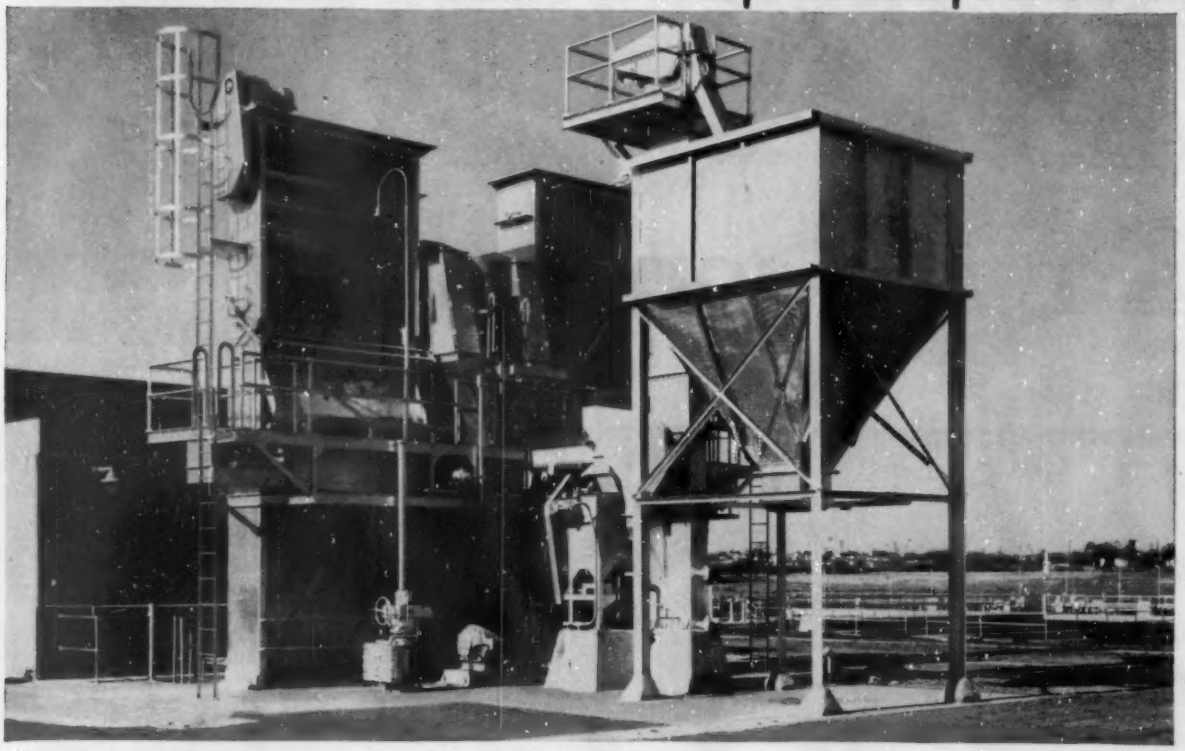
PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
761 Sunnyside Ave., Libertyville, Ill.

Send full data on "PAYLOADER" tractor-shovels:
☐ 4-wheel drives to 2¼ cu. yd. ☐ Rear-wheel-drives to 1 cu. yd.

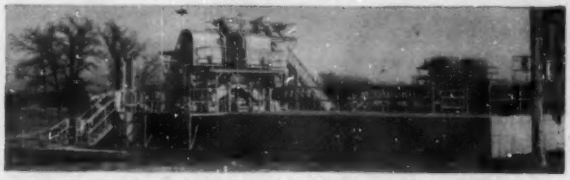
Name _____
Title _____
Gov't Unit _____
Street _____
City _____ State _____

What's new at White Rock, Dallas, Texas?



1953 Two Jeffrey Grit Collectors, two Screens, a Grinder and Grit Washer.

1953 Sludge Collectors in primary and final tanks. Skimmers in primary tanks.



1952 Two Jeffrey Screens and two Jeffrey Grit Collectors.
1949 Two Jeffrey Screens and a Screenings Grinder.

1939 Sludge Collectors and Skimmers in primary tanks.

1939 Jeffrey Sludge Collectors in the final tanks.

Repeat Orders from long-time users of Jeffrey Sanitation Equipment are the best evidence of the high quality, durability and fine engineering design. For a copy of Catalog 833-A describing this equipment, write The Jeffrey Manufacturing Company, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING

tached in a matter of minutes.

36

Engineers Choose

TYLOX *Rubber* PIPE GASKETS

to make WATER-TIGHT JOINTS • REDUCE PIPE-LAYING COSTS

on Millcreek Township Sewer Project

PROJECT: Sewers to serve 42 residences and 10 commercial buildings of Tracydale Development Company Project in Millcreek Township, Erie, Pa.

CONTRACTOR: Lee Taylor, General Contractor, Erie, Pa.

ENGINEERS: Owen Richardson, Township Engineer, and Wallace DeArment, Consultant.

PIPE: 6" and 8" vitrified Clay pipe with pre-assembled TYLOX Rubber Joints, manufactured by Universal Sewer Pipe Corporation, Cleveland, Ohio.

Providing sewer facilities for a large housing project posed tough problems for the Tracydale Development Company. Thousands of feet of mains and laterals had to be laid in a stratum of water-bearing sand. Trenching costs would be terrific, not to mention the man hours required to couple the line in flooded trenches. A *fast* way to make *leak-proof* pipe joints was needed.

Millcreek Township engineers had the answer . . . Their specification for TYLOX RUBBER JOINTS not only offset high excavating costs with fast pipe-laying, but kept infiltration far below the strict permissibles. The engineers knew, too, that TYLOX Gaskets would keep *future* costs down . . . with a root-proof, sediment-proof compression joint that would not have to be "dug up" in a few years for repairs.

Specify TYLOX RUBBER GASKETS to assure fast-working, leak-proof and non-deteriorating joints for your pipe jobs. Write for more TYLOX engineering details and case histories.

HAMILTON KENT MANUFACTURING COMPANY

KENT, OHIO

427 West Grant St. ORchard 3-9555

5030

continuous

Dodson's Digest

How to make ice disappear like magic

Stopped in to see Al Russell on my last trip up North. Al is a county road commissioner, and also a pretty good amateur magician.

"How's tricks?" I asked him.

"I'm working on the hardest trick I know, Dod," he replied. "I'm trying to keep my ice-control costs down. I can't do it with mirrors, so . . . "

"I know the secret of that trick, Al," I broke in. "It's all done with pellets."

"What kind of pellets?" Al asked.

"Calcium Chloride pellets," I explained. "They're free-flowing, so they're easier to handle and spread. This cuts your labor cost, and . . . "

"That's a pretty good trick in itself," he admitted.

"What's more," I went on, "Calcium Chloride pellets do a better job of removing ice from highways. Because they're practically anhydrous, Calcium Chloride pellets generate a lot of heat when they go into solution. This heat, and the special shape of the pellets, cause them to bore right through the ice, breaking the bond between the ice and the road . . . making it easier to blade away."

"And some of the ice would even be swept off by passing traffic," Al mused, stroking his chin.

"On top of that," I continued, "you can buy Calcium Chloride pellets in bulk, and store them. This eliminates package costs, cuts loading time . . . "

"You know, Dod," Al said. "I'm beginning to think that you're a better magician than I am."

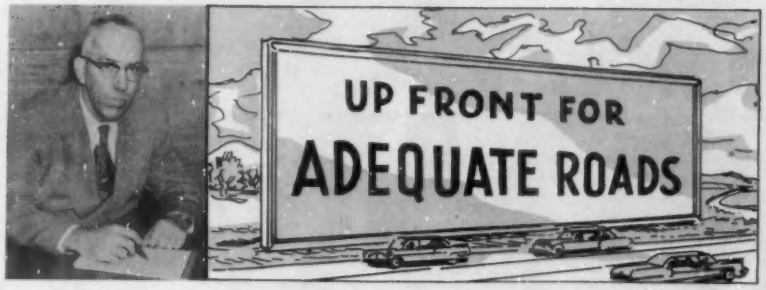
"Nonsense," I protested. "Why, I've seen you saw a woman in half, and never even draw blood."

"That's nothing," Al grinned. "You just cut my ice-control costs in half, and kept traffic flowing through every main artery in the county!"

— L. D. Dodson

P.S.—Our Calcium Chloride pellets can help cut costs in *your* ice-removal operation, too. Find out all about them in our new booklet, "Pellets . . . a New Form of Wyandotte Calcium Chloride." To get your free copy, just drop me a line. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte
CHEMICALS
MICHIGAN ALKALI DIVISION
HEADQUARTERS FOR CALCIUM CHLORIDE



by LEO J. RITTER, JR.

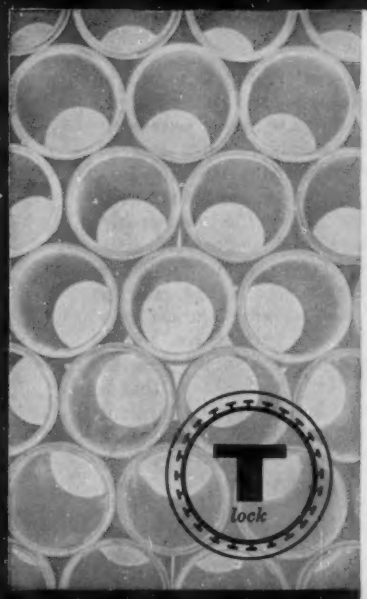
Highway Consultant

In the Works — Great things are in store for all of you highway and street engineers who read *Public Works* during the next few months. Among the outstanding major articles scheduled for publication this year are the following—one on design and construction of hot-mix asphaltic pavements by engineers of the Barber-Greene Company. Another on bituminous surface treatments by Fred Benson of Texas A & M, an authority in the field. A pair of articles on the location and evaluation of gravel deposits in glaciated areas, by Jim Spencer and Olin Dart of Cornell University. There'll also be one on the application of electronic computers to highway engineering operations by an engineer of the Bureau of Public Roads. All in all, it looks like a big year for you readers, so as the man says, don't change the channel.

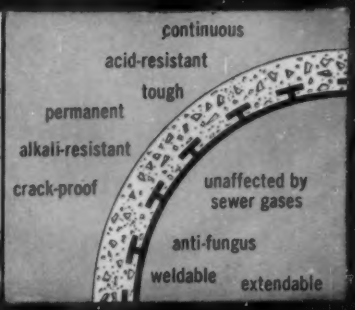
The Interstate System — Think what you may, you can't avoid the National System of Interstate Highways in the news these days, if you are in the highway field. Of course, it's really beginning to roll now, with contracts being let and construction projects starting up all over the country. Interesting things are popping up—for example, the Journal of Commerce has reported that the $26 billion, 40 000-mile program could conceivably grow to 52,000 miles and $32 billion at this session of Congress, because of a recent survey indicating that the states feel the need of including an additional 12,000 miles in the system. This doesn't seem too likely to me this year, but there is no question—barring a major war or depression—that the program will grow and grow with the passage of time. Meanwhile, John A. Volpe, Federal Highway Administrator, warned of two major pitfalls which must be avoided in carrying out the program —lack of full and adequate planning, and the temptation to overdesign and overbuild, particularly since 90 percent of the cost is to be "federal" money. Mr. Volpe has given timely and good advice. A step taken by the BPR while Mr. Volpe was handling the reins was to delegate to BPR field offices the authority to approve programs proposed by the states for construction on the federal aid secondary road system—this is fine, since it will expedite FAS projects.

Thin Concrete Roads — We continue to be interested in the use of thin concrete road slabs in Iowa on secondary road construction. O. K. Frink, County Engineer of Polk County (Des Moines) described the use of this type of construction in a paper at a recent conference at Iowa State College. In 1955 and 1956, Polk County built some 16 miles of 6-inch, unreinforced concrete pavements at prices of $2.32 and $2.48 per square yard. For a period of several months, one section of this type of construction carried traffic estimated at more than 10,000 vehicles per day, with 7 percent being heavy trucks. It was to be expected that some damage to the pavement would take place under such heavy traffic, and some has occurred. However, a recent survey showed that only 284 square yards would require replacement. The public likes this type of construction and this writer does, too—it seems to us that it offers lots of advantages and deserves serious consideration in many areas.

Highway Conferences, Short Courses and Extension Work — A comprehensive report on the highway extension activities of colleges and universities in the United States has been released by a committee of the Educational Division of the American Road Builders' Association. The Committee is under the leadership of J. W. Spencer of Cornell University, who is also the President of the Division. The re-



T-lock® sewer lining prevents hydrogen sulfide attack...



Tunnels present no difficulty even when using collapsible forms.

MILLIONS OF SQUARE FEET NOW IN USE! T-Lock Amer-Plate permanently ends corrosion in concrete sewer systems—because it is impervious to hydrogen sulfide, other sewer gases, fungus, bacteria, acids, alkalies and salts.

T-Lock is an extremely dense, flexible, crack-proof liner of high polymer vinyl resin. Integral T-shaped ribs are permanently locked into concrete during pouring. Joints are heat-fused to form a continuous protective lining that will not separate from the concrete even under extreme back pressure.

Over 3 million square feet of T-Lock Amer-Plate have been installed in pre-cast, cast-in-place and monolithic sewer structures of all sizes with no sacrifice of structural strength — at costs comparable to earlier lining methods.

Illustrated brochure and list of typical installations on request.

Houston, Tex.
Jacksonville, Fla.
Kenilworth, N.J.
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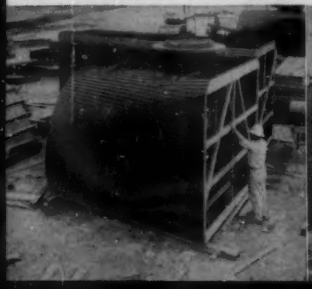
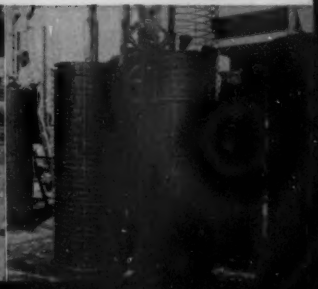
Readily adaptable to complex forms for cast-in-place structures.

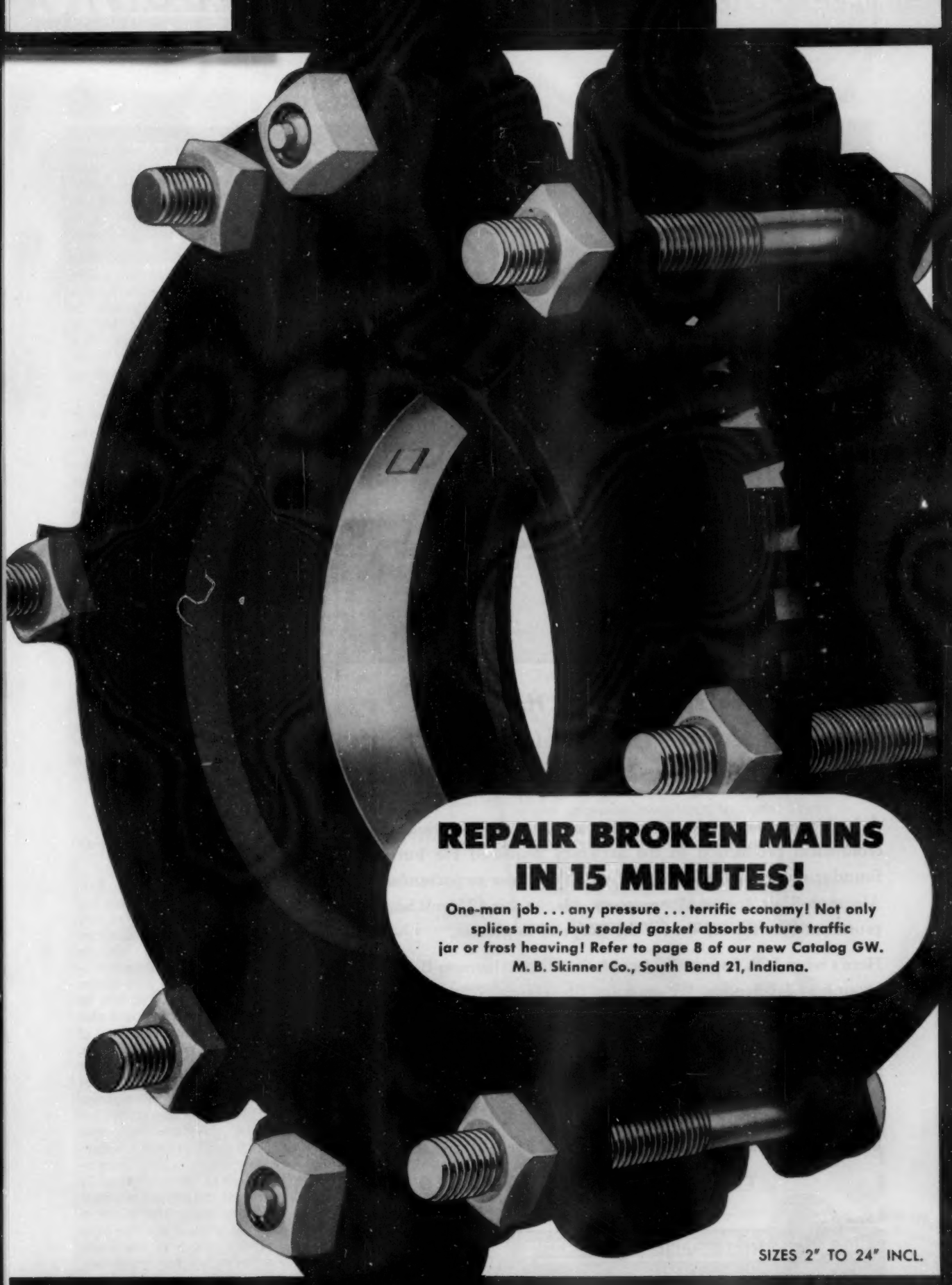


T-Lock in place on inner form before pipe is poured.



port is full of interesting information about the scope and potential of highway engineering extension work. For example, more than 20 "highway conferences" are now being held on the annual basis over the country under the sponsorship of various state colleges and universities, in cooperation with other groups. A variety of short courses and in-service training courses have been, and are being, given under the leadership of the same agencies. All in all, the report shows that a tremendous amount of excellent highway engineering extension work is being carried on. However, it is still not enough—and in many places, the local road or street engineer does not have ample opportunity to participate in these worthwhile activities. What's to do about it? One thing, of course, is continually to persist in trying to persuade your boss to send you to the conferences which do exist in your state, with expenses paid—hit him over the head, if necessary, to convince him that the organization will get its money back, which I almost guarantee it will. If there is no conference, short course, or similar activity available in your state—go to the state college or university and hit those people over the head until they put on one. Above all, be interested in highway extension activities and demand more and more of them. The college and university people are generally only too glad to cooperate, provided there is a demand.

Traffic Patterns — A very interesting report of the experience of the Bureau of Public Roads in the application of a statistical method to the determination of traffic volumes is contained in the December issue of *Public Roads*. The report covers some aspects of the application of a relatively new technique for estimating ADT (Average daily volume of traffic moving over a given highway during a year) at locations where continuous counting stations have not been established. The basic method—which has been used by some states—is called the "traffic patterns" method. It is based upon observations in recent years that monthly traffic variations form patterns which tend to persist from year to year on the same road sections. Similarities among patterns permit groupings of rural road sections accordingly, thus permitting estimation of traffic volumes to be accomplished with either savings in manpower or the collection of more



REPAIR BROKEN MAINS IN 15 MINUTES!

One-man job . . . any pressure . . . terrific economy! Not only splices main, but *sealed gasket* absorbs future traffic jar or frost heaving! Refer to page 8 of our new Catalog GW. M. B. Skinner Co., South Bend 21, Indiana.

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accurate or extensive information at the same cost. Statistical methods of test described in the article show that, in most cases, the method gives estimated traffic volumes within the range of desirable accuracy, as compared with true traffic volumes.

A Record — As expected, 1956 was a record-breaking year for traffic fatalities. An estimate made by the National Safety Council early in January placed the death toll at 40,200, the highest in history. This black mark throws a gauntlet in the face of every person concerned in any way with highway safety.

Round and About — The largest appropriation ($8.5 million) in the history of the Valley Highway in Denver is expected to advance the completion date of this long-awaited expressway to late 1958, a full year ahead of schedule. Montana became the 27th state to adopt a constitutional amendment prohibiting diversion of highway user taxes by passage of a "good roads" amendment prohibiting diversion of highway user taxes at the polls last November. Meanwhile, the Automotive Safety Foundation has completed its engineering study of all street and road systems in Montana; findings and recommendations have been sent to the state legislature fact finding committee. Next project for the Highways Division of the ASF is a priority and programming study for the Kentucky Department of Highways.

• • •

Survey of Sanitary Conditions on Construction Projects

A sanitarian of the Phoenix, Arizona, Public Health Department has been assigned to make a survey relative to the safety of drinking water and other sanitary facilities supplied for workers on construction projects within the City limits. Bacteriological examinations will be made of samples of water and also of samples taken from surfaces of drinking cups and water containers. Sanitary facilities supplied for workers will also be examined for efficiency and quality of upkeep. Many workers of various trades are involved and providing them with adequate, safe sanitary facilities during working hours where permanent installations are not readily available is an important problem facing all contractors. The safety of the individual worker and the protection of the health of the community at large are the prime factors involved.

FITCHBURG CHIPPER STEPS UP
Rhode Island Brush Removal

...CONSOLIDATES THE BULK

...LESSENS DUMPING OPERATIONS

...REQUIRES MINIMUM MAINTENANCE

...REDUCES MANPOWER

State of Rhode Island and Providence Plantations
DEPARTMENT OF PUBLIC WORKS
DIVISION OF ROADS AND BRIDGES MAINTENANCE SECTION
80 ARLOC STREET, PROVIDENCE 8, R.I.

September 24, 1956

Mr. W.O. Forman, President
Fitchburg Engineering Corporation
Fitchburg, Massachusetts

Dear Sir:

This is the second year our Fitchburg Chipper has been in service. We are very well satisfied with its performance.

It steps up our brush removal program. It consolidates the bulk, thereby lessening dumping operations. It requires minimum maintenance and manpower.

During the 1955 hurricanes and floods, we found it especially beneficial in disposing of branches and limbs of trees, thus speeding up the opening of the highways.

Very truly yours,

Edmund V. Carlos

Edmund V. Carlos, Supt.
Northwest Division

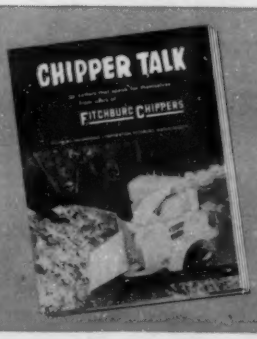
c.c. Mr. Edgar E. Maynard,
Road Maintenance Engineer.

Brush disposal cost can be reduced.

Your City will find that the Fitchburg Wood Chipper is money-saving equipment in your Highway or Park Departments. Tree trimmings are quickly reduced into load-saving wood chips. Fewer loads cut your loading and hauling expenses. Brush removal becomes a faster, simpler, less expensive operation.

Fitchburg Wood Chippers are engineered to stand hard use, to give long service without excessive maintenance costs. There is only one Wood Chipper on the market today with a One Year Guarantee...The Fitchburg Wood Chipper.

Send coupon for a copy of "Chipper Talk." Find out how a Fitchburg Wood Chipper will fit your brush disposal problems.



Free Portfolio "CHIPPER TALK"

Complete cutaway color drawings of Fitchburg Chipper in action. Specifications. Photo copies of letters from municipalities, commissions, counties, contractors, tree care men.

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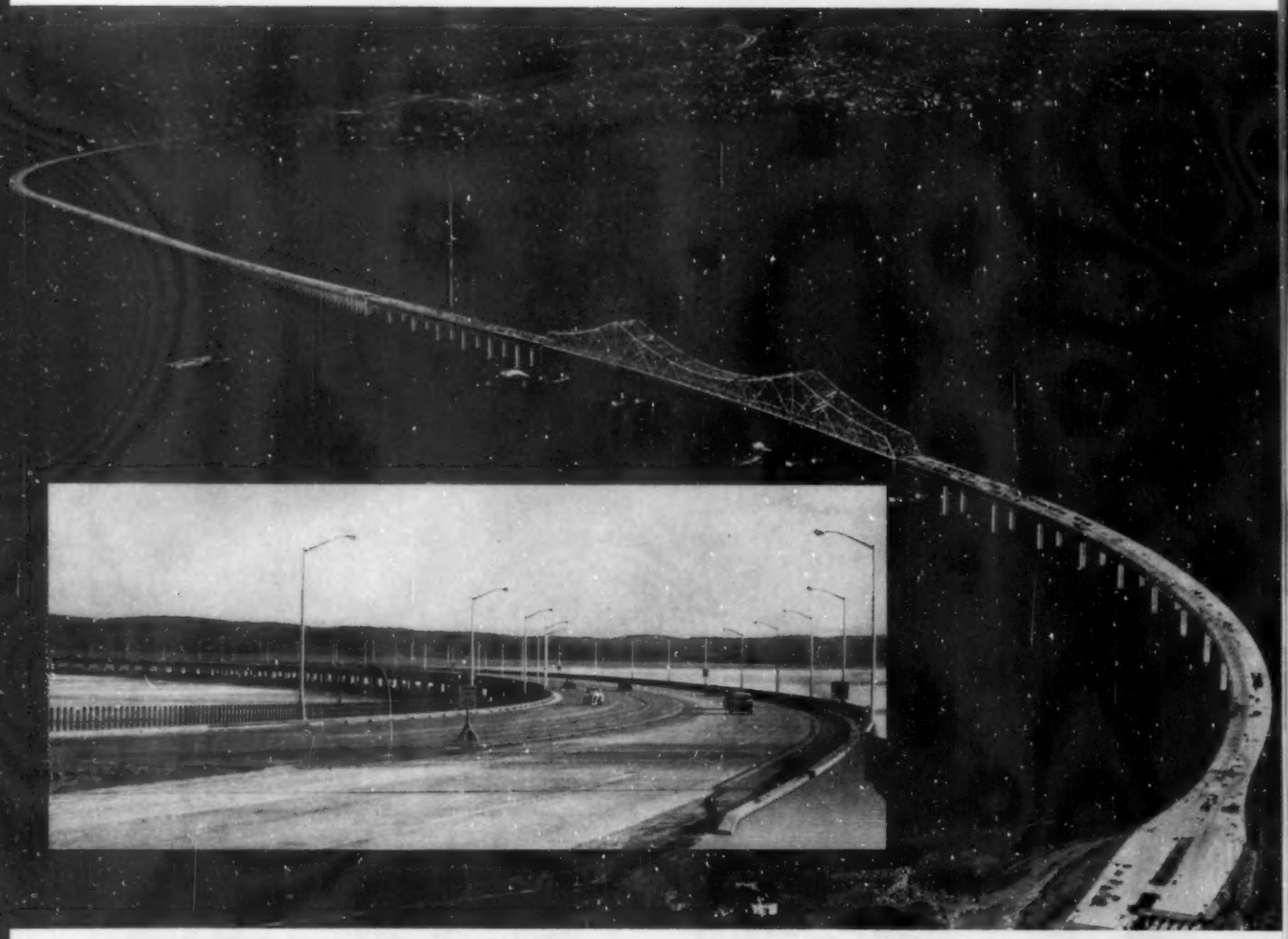


How HAPCO Poles cut maintenance on the New York Thruway...

When the New York Thruway planners specified HAPCO Aluminum alloy lighting standards for the Tappan Zee Bridge, they specified the end of pole painting maintenance. For this most concentrated over-the-water lighting installation in the world posed a major maintenance problem due to its exposure to great amounts of moisture.

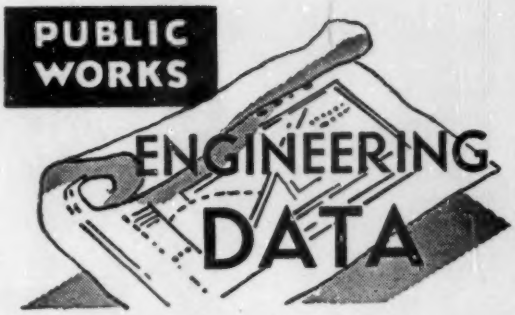
Solving the problem with 220 HAPCO tapered Aluminum Poles and 35 special HAPCO Lighting Brackets for mounting on the middle span was a no-maintenance investment. That's because HAPCO Aluminum Poles and Brackets are corrosion resistant. They require no initial or maintenance painting. Maximum structural strength is assured because HAPCO Poles are spun from Aluminum Alloy and Heat-treated. Their silver grey beauty blends with the most modern surroundings, provides the highest visibility for maximum safety.

What's more, HAPCO Standards are designed to fit your individual requirements. Your Hubbard representative will be glad to assist you in specifying the HAPCO Pole that exactly fits your needs. And they're available from more than 300 leading electrical distributors throughout the United States.

Free HAPCO Catalog

If you'd like more details on design features and specifications of the complete Hapco line, write for catalog HAL 754. It contains valuable information to help you plan the most efficient, most beautiful highway and street lighting, as well as any other outdoor lighting requirement. (Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pa.)

HUBBARD ALUMINUM PRODUCTS COMPANY
Division of Hubbard & Company, Pittsburgh 1, Pa.



Right-Of-Way Policy For Arterial Projects

Property owners in Phoenix, Arizona, stand to benefit from a new policy adopted by the City Council for obtaining necessary right-of-way for arterial street widening projects. This policy provides that property owners who dedicate part of their property for street right-of-way free will be assessed not more than $9 a front foot, compared with the present average cost of $13.50. The City will assume the cost above $9. This will mean a saving of approximately $4.50 per front foot on arterial street widening projects, for those who give right-of-way. If property owners refuse to dedicate the required land for right-of-way their property will be condemned and they will be assessed the full cost of construction now estimated at $13.50 per front foot. This policy will apply on all arterial streets, whether or not they qualify for Federal aid.

The new policy is expected to make it easier to obtain right-of-way and thereby speed the arterial street improvement program. Advantages to the City are: (1) there will be fewer condemnation suits and more voluntary dedication of right-of-way; (2) right-of-way can be obtained far in advance of the start of a proposed project, since an agreement between the City and landowners could be reached without monetary consideration at the time. Benefits to property owners are: (1) those on arterial streets would be assessed approximately the same as those on residential streets ($8 to $10 per front foot); (2) individual assessments on arterial property would be reduced by one-third for those who voluntarily dedicate right-of-way.

Garbage Grinding Pays Its Way

Garbage is ground and treated in digesters, the same as sewage sludge, in Canton, O. It is estimated that 2,000 cu. ft. of gas is produced per ton of garbage and this gas is used in engines to produce power needed to operate pumps and air blowers.

The grinding plant is located in a separate building at the sewage plant site. The garbage is brought to the processing plant, weighed and discharged into a hopper which has a capacity of ten tons. From the hopper, it is conveyed by 48-in. wide conveyor to the grinder. Two men supervise the feeding of the garbage into the Jeffrey grinder, sorting it to remove metal, tableware, glass, crockery, wood, feathers in bulk and larger bones. Corn husks are also removed, which means extra work in the months when corn is on the market, one man being added then.

The pulped garbage, with water added to make a slurry, flows to a grit removal device, also supplied by Jeffrey, which provides a scrubbing action, taking

out heavy material. This material is elevated to a truck and disposed of by burial. The garbage slurry is pumped to the digesters.

There are ten digesters. Six with fixed covers and provision for heating serve as primary units; the other four have floating covers and are of the gasholder type. The digesters are 90 ft. in diameter, with 20-ft. sidewater depth and provide 8.3 cu. ft. of capacity per capita. Digested sludge is used for fertilizer, being handled to a farm about 5 miles away by a 10-in. cast iron pipe. En route, storage is provided in Imhoff tanks which provided the original treatment for Canton. Thence it is raised by two-stage centrifugal pumps to high points on the farm, the head being as much as 400 ft. Final distribution is by ditches over about 600 acres of hilly farm and pasture land.

Population of Canton is about 120,000; the plant is designed for 160,000 population and a flow of 20 mgd. Present flow is about 16 mgd. Overall BOD and SS reductions range from 90 to 95 percent.

County Subdivision Sewage Treatment

Sewage treatment plants are being constructed for five communities in Cook Co., Ill., and three communities in Du Page County. In Cook Co., Country Club Hills will have an aeration type plant with an oxidation pond; Edgewood Park and Dowe Development will use the same methods. Plum Grove Estates will have a trickling filter plant and the fifth development an activated sludge plant.

In Du Page Co., the treatment method for Nordic Park has not been announced; Suncrest will use a trickling filter; and Country Club Highlands an aeration plant and oxidation pond.

Fly Ash Used for Bituminous Road Construction

The Pennsylvania State Highway Department, in cooperation with Bituminous Coal Research, Inc., Duquesne Light Co., and Rochez Brothers Co., Inc., recently constructed an experimental road containing fly ash in its base course at Penn Township, near Pittsburgh, Pa. The 500-ft. bituminous-surface section of Lime Hollow Road in Penn Township was built during August and September, using 67 tons of fly ash to choke the base course of the road.

The State Highway Department built the section after approving a similar road constructed three years ago by the Duquesne Light Co. The road was installed at the suggestion of Bituminous Coal Research, Inc., at Duquesne's Phillips Power Station near Pittsburgh.

H. H. Russell, BCR project engineer, suggested the State use fly ash to save money by choking the base course with fly ash rather than with granulated slag. Savings are made because:

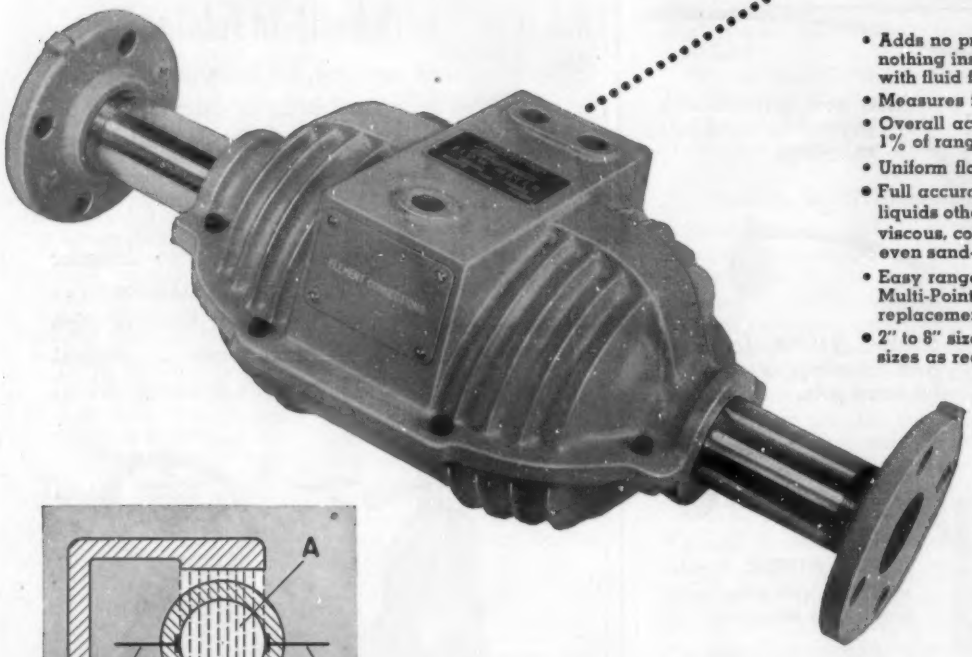
1. Fly ash can be applied directly to the road from the supply point, eliminating the cost of handling the slag from stockpiles. Fly ash is available at all times whereas slag must be stockpiled to assure available quantities when needed.

2. In many cases, the delivered price of fly ash is cheaper than that of granulated slag.

3. In fly ash choking operations, a labor savings can be obtained because fly ash is free-flowing and needs little attention in being worked into place.

The Lime Hollow Road section base was installed in two four-inch layers. The first layer was choked with dry fly ash and the second with wet fly ash.

NEW! a flow meter with no flow restrictions!



- Adds no pressure drop — nothing inside pipe to interfere with fluid flow.
- Measures fluid velocity directly.
- Overall accuracy better than 1% of range over entire scale.
- Uniform flow scale.
- Full accuracy sustained even on liquids other meters can't handle: viscous, corrosive, or pulpy — even sand-water slurries.
- Easy range change — either by Multi-Point Switch or range coil replacement, as preferred.
- 2" to 8" sizes standard — larger sizes as required.

SIMPLE, TROUBLEFREE, OPERATION

The Foxboro Magnetic Flow Meter operates on the same principle as a power generator. A magnetic field (A) is maintained through a standard pipe section (B) of stainless steel or other non-magnetic material. This pipe section is lined with Kel-F® or other insulating material. Liquid passing through pipe acts as moving conductor, generating an electric voltage which varies in proportion to liquid's average velocity. Flush electrodes (C) in pipe wall "pick up" this voltage which is recorded in desired flow units by Dynalog Electronic Recorder or Controller.

This premium-performance meter measures *magnetically* the flow rate of virtually any liquid except hydrocarbons. It completely ignores such common metering headaches as turbulence, suspended solids, and variations in conductivity, density, and viscosity. It even measures reversing flows.

Installation is simple. The magnetic spool piece connects into the line like any equivalent length of pipe — no seals, purges, meter runs, or straightening vanes required. Connects by 2-conductor cable to remote Dynalog Electronic Flow Recorder.

Maintenance is practically eliminated. There are no pressure taps to become plugged or frozen, no working parts to foul.

Foxboro Magnetic Flow Meters are already in use on such widely different liquids as beer, sand-and-water, rosin size, rock-and-acid slurry, viscose, and highly corrosive liquid detergent. Find out how this precise, troublefree flow meter can help *your* processing. Write for complete details.

THE FOXBORO COMPANY, 992 NEPONSET AVENUE, FOXBORO, MASS., U. S. A.

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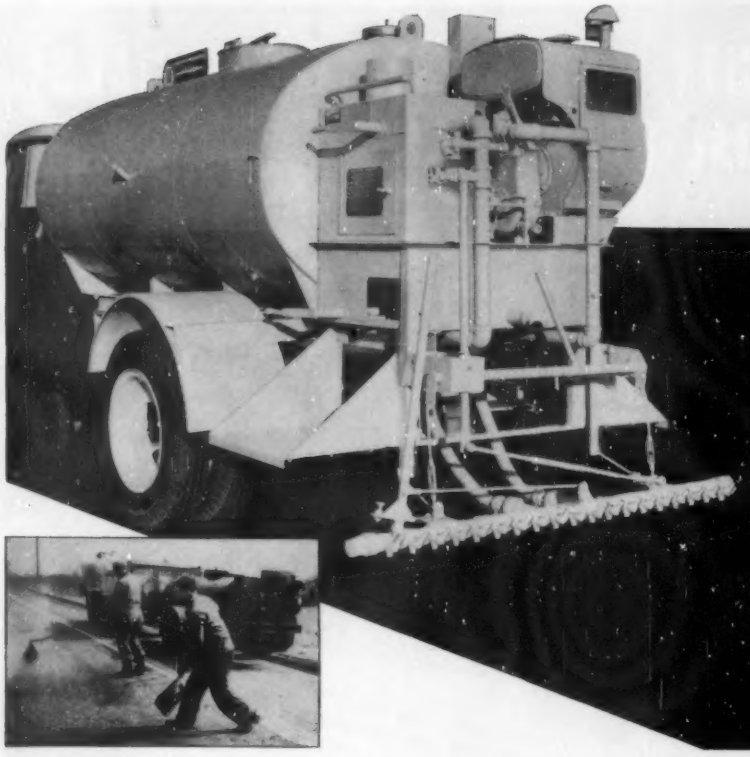
REG U S PAT OFF

Foremost in FLOW METERING

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

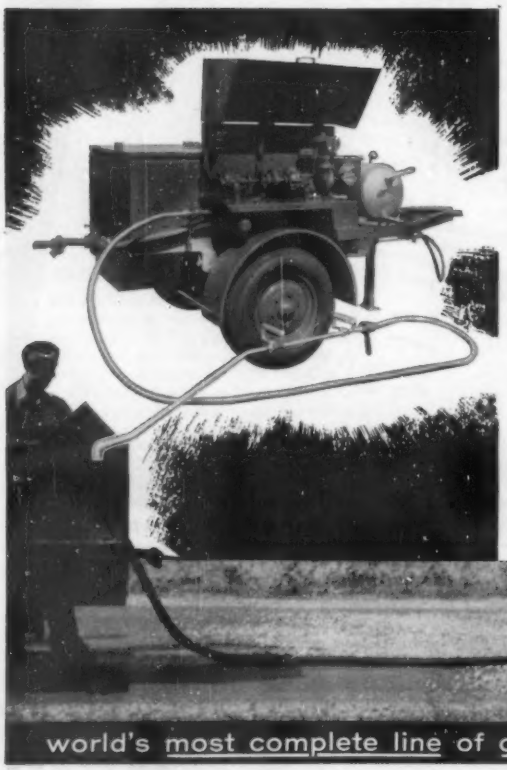


Utility spray tank for hand patching and bar spraying

With the complete line of Littleford black top equipment, there's never any compromise with your requirements. Nor do you ever have to buy a unit larger than you need.

The 101 utility spray tank is designed for contractors and municipalities doing a lot of patching including some bar spraying. It's ready for all your jobs whenever you want it, and without skilled operators. Truck mounted or trailer models, sizes 400 to 1000 gal. capacity. Write for bulletin 5.

LITTLEFORD the right equipment for every job



tar and asphalt kettle for hand patching only

Where you're doing all hand patching and no bar spraying, the 84HD kettle is your best buy. Two patented features—the double heat circulation system and the screened reservoir—make the fastest, safest maintenance kettle on the market. Made in 3 models: standard, with hand spray attachment (below) and with motor spray attachment (left). Write for bulletin 1. Littleford Bros., Inc., dept. LB 223, 452 E. Pearl St., Cincinnati 2, Ohio.

1882 - 1957 75 LITTLEFORD CINCINNATI TOPS IN BLACK TOP

world's most complete line of completely engineered black top equipment

Air-Tool Maintenance Tips That Help Keep Costs Down

by LE ROI

Not many machines take the beating that rock drills and paving breakers do. Steel strikes steel 2,000 blows a minute, with a cumulative impact of 40,000 foot-pounds every 60 seconds.

Despite the rough usage rock drills get, preventive maintenance pays off. Here are a few of the basic things you can do easily—to keep your tools running longer and keep your costs down:

Le Roi-Cleveland automatic air-line oiler and 10-ft whip hose. Capacity one quart

(Right) New 2-gallon air-line oiler. Automatic. Designed for wagon-drill and jumbo service.

★ ★ ★

See that your machines get plenty of oil. This is of vital importance. There are no piston rings in a rock drill, so the piston must fit the cylinder with practically zero clearance. If lubrication is neglected, hardened steel parts score and break.

Fill the integral lubrication chamber in the drill at the start of each shift and after every 3 hours of operation. Better yet, use a Le Roi-Cleveland air-line lubricator placed 10 feet from the machine. This type of lubricator needs filling only once each shift; the flow of oil can be adjusted as desired.

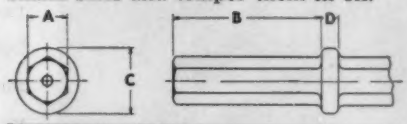
Le Roi-Cleveland Veribest rock drill hose. Oil- and heat-resistant.

Use only good hose and pipe. Pieces of rubber from oil-rotted hose will clog your drill so that it can't run. Scale from old rusty pipe can score the cylinder of your machine and result in expensive repairs.

We recommend the use of Le Roi-Cleveland "Veribest" hose. It was designed especially for rock drill service, with an abrasion-resistant outer cover and a special inner liner that resists the corrosive action of oil and hot air.

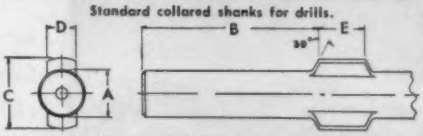
Be sure your drill steel shanks are properly sized and tempered. Undersized shanks cause rapid chuck wear that leads to broken pistons. Short shanks and long shanks reduce the force of blow — slow down your drilling. Shanks that are too soft stick in the machine. And, when they are too hard, they cause the piston to spall. This may ruin a drill cylinder. Poor shanks are expensive.

Follow these diagrams for correct shank sizes and temper them in oil.



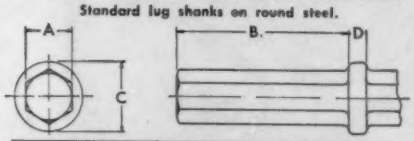
NOMINAL SIZE	A	B	C	D
⅞ HEX. x 3¼	⅞	3¼-3⅜	1⅜	⅜
⅞ Q.O. x 3¼	⅞	3¼-3⅜	1⅜	⅜
1 HEX. x 4¼	1	4¼-4⅜	1½	⅜
1 Q.O. x 4¼	1	4¼-4⅜	1½	⅜

Standard collared shanks for drills.



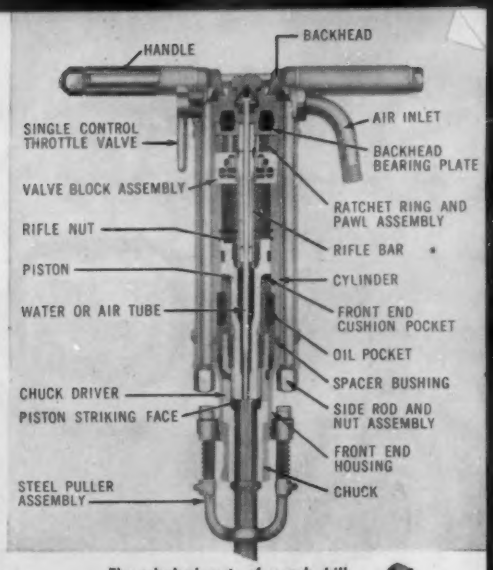
NOMINAL SIZE	A	B	C	D	E
1 LUG	1	3 13/16-3⅞	1½	⅝	1
1⅛ LUG	1⅛	3 13/16-3⅞	1¾	¾	¾
1¼ LUG	1¼	3 13/16-3⅞	1⅞	13/16	¾
1½ LUG	1½	5 -5 1/16	2¼	1	1

Standard lug shanks on round steel.



NOMINAL SIZE	A	B	C	D
1 HEX. x 4¼	1	4¼-4 5/16	1½	⅜
1⅛ HEX. x 6	1⅛	6 -6 1/16	1¾	½
1¼ HEX. x 6	1¼	6 -6 1/16	1¾	½

Standard collared shanks for paving breakers.



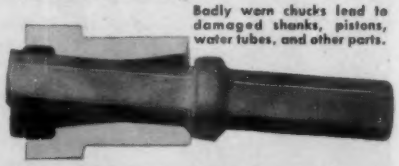
The principal parts of a rock drill.

Keep the striking faces of pistons and shanks square. In time, wear will tend to cup the piston face. When this occurs, the face should be ground until it is flat. Shanks should be square, too, if excessive piston damage is to be avoided.

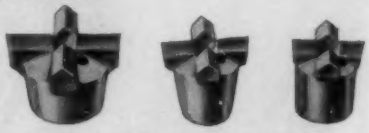
Correctly faced pistons and shanks stand unsupported.

Don't use worn chucks. A worn chuck allows the drill steel to become misaligned in the machine. As a result, the piston strikes the sharp corners of the drill shank, and you have the cost of a broken piston in addition to the loss of footage.

Badly worn chucks lead to damaged shanks, pistons, water tubes, and other parts.



Use sharp bits. Dull bits bind in the hole and slow down the drilling. They also cause excessive strains on the machine and rapid wear of all rotating parts.



Le Roi-Cleveland one-use CRD detachable bits.

Le Roi-Cleveland developed the "one-use" CRD detachable bit, so that rock-drill operators can use sharp bits all the time at a considerable saving.

* * *

Yes, preventive maintenance pays off. If you'd like to post these tips as a reminder to your drill runners, a supply of reprints will be sent you free of charge Just write for them.

LEGAL ASPECTS OF PUBLIC WORKS

MELVIN NORD,
Dr. Eng. Sci., LL. B.

Up the Millcreek

The case of *Township of Millcreek v. A Piece of Land Fronting on Montpelier Avenue*, 181 Pa. Super, 214; 124 Atl. (2d) 448—a Pennsylvania case decided Oct. 8, 1956—involved an assessment against the owners of land for sewer improvements. The land owners claimed that the sewers previously installed had been dedicated to the township, and that it was therefore the responsibility of the township to maintain them without assessing the owners for improvements.

The original sewers had been privately constructed, and when the receiving septic tank fell into a state of disrepair, the effluent ran untreated over the bank bordering Lake Erie into an area where several summer cottages were located. These residents complained to the State Health Department. As a result, the township was required to receive the effluent in the township sewer system, but in so doing it expressly repudiated any inference that it was accepting the sewer system itself.

The result, therefore, was that the owners of the "Piece of Land Fronting on Montepelier Avenue" were required to pay $1440.63 with interest, as assessments for new sewers when they were installed by the township. The reason is simply that it takes two to make a "dedication", and since the township had never accepted the sewer system, it still belonged to the owners of the land.

Drive-in with a Vengeance

The case of *Callahan v. The Town of Middleton*, 292 S.W. (2d) 501, a Tennessee case decided Oct. 8, 1954, involved a drive-in restaurant and a town which wanted to make it a *real* "drive-in" by converting part of it into a highway.

Callahan was the owner of the Rainbow Inn Cafe, along State Highway 125. In 1952, the State Highway Department, with the authority of the Town of Middleton, widened the highway, thus taking a strip of his land. Then, in order to keep the highway out of the Cafe altogether, the town built a sidewalk across the entire front of the property, changed the level of the street, blocked the front entrance, and erected a concrete curb, thus cutting off his drive-in business.

He sued the town for $20,000, and obtained a verdict for $1500. The Town appealed to the Court of Appeals and the Supreme Court of Tennessee, on the ground that Callahan had no right to complain, since he was a member of a three-man committee which had worked on acquiring deeds for the highway-widening project. This argument was rejected, since the plans showed only a 40-foot right of way, but the town actually used a 60-foot right of way, including the sidewalk. The fact that he was on a committee does not mean that he can be required to donate a right of way.

Boston Main

In *Iver Johnson Sporting Goods Co. v. City of Boston*. 135 N.E. (2d) 658, a Massachusetts case decided July 6, 1956, a break in a water main of the City of Boston caused flooding of the plaintiff's building. He sued the City for the resulting damages, but the trial court directed a verdict against him on the ground that the City was immune from suit.

On appeal, the trial court's decision was reversed. It was held that the distribution and sale of water for domestic purposes is a proprietary and not a governmental function. This is in accordance with the general rule.

A city ordinance also provided that anyone who maintains a cellar or excavation "shall do so only on condition that such maintenance shall be considered an agreement on

his part to hold the City harmless from any claims for damages . . . resulting from . . . water leaking into such excavation. . . "The court held that the City could not create immunity for itself in this way."

Holy Highways

Fitzpatrick v. New York, 151 N.Y. Supp (2d) 534, (decided April 13, 1956), related to a highway which was wholly or partly full of holes. The hole in question, to which we *now* direct our attention, was about a foot from the shoulder, 2-6 inches deep, and about one foot wide. At the time in question, the hole was full of water and the shoulder was muddy.

The wheel of a car going 35-40 miles per hour struck the hole. The steering wheel went out of the driver's hands, the car went over the embankment and rolled over three times. As a result, three people were injured.

In a suit against the state for negligence in maintaining the highway, the three victims recovered a total of about $8800.

This shows that it is not enough to have magnificent throughways if we are going to let the regular highway system go to potholes.

• • •

Data From An Annual Report

The Annual Report of Raleigh, North Carolina states that as of July 1, 1956 there are a total of 211.45 miles of streets in the city. Of this total, 122.08 miles are paved, 49.25 miles are stabilized surface, 29.74 miles are state highways, 6.94 miles are open streets, 0.24 mile of unsurfaced and 3.20 miles are not open. Cost of maintenance of the unpaved streets, including drainage for the 1955-1956 fiscal year was $69,681.70 and the cost of maintaining the paved streets, including drainage was $43,945.19 for the year. The city also spent $32,446.82 on seal treatment, $1,189.65 on sidewalk repair and $852.24 on snow and ice removal.

• • •

Small Community has Large Water Plant

A community of 494 population, Gilcrest, Colo., has recently completed a $70,000 water system. There are two 90-ft. wells equipped with turbine pumps and supplying up to 250 gpm at 90 psi. The pumps operate alternately, delivering to a 6,000-gal. storage tank. On the way to the tank, the water is automatically chlorinated.

15 ways to save time and materials on curb, gutter and sidewalk jobs...

CURB and GUTTER FORMS


When joints are 5 to 10 feet apart


When joints are not 5 to 10 feet apart


For curved work of variable radius


When joints are not 5 to 10 feet apart


Integral curb forms


For use with fixed radius back and gutter forms


When joints are 5 to 10 feet apart


Integral curb forms


For curved work when same radius is repeated

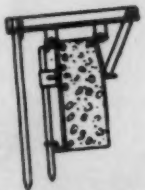
CURB FORMS


Vertical back and face


Vertical back with battered face


Vertical back with battered exposed face


Integral curb form with battered exposed face


Integral curb form with battered exposed face

SIDEWALK FORMS


For any width and thickness

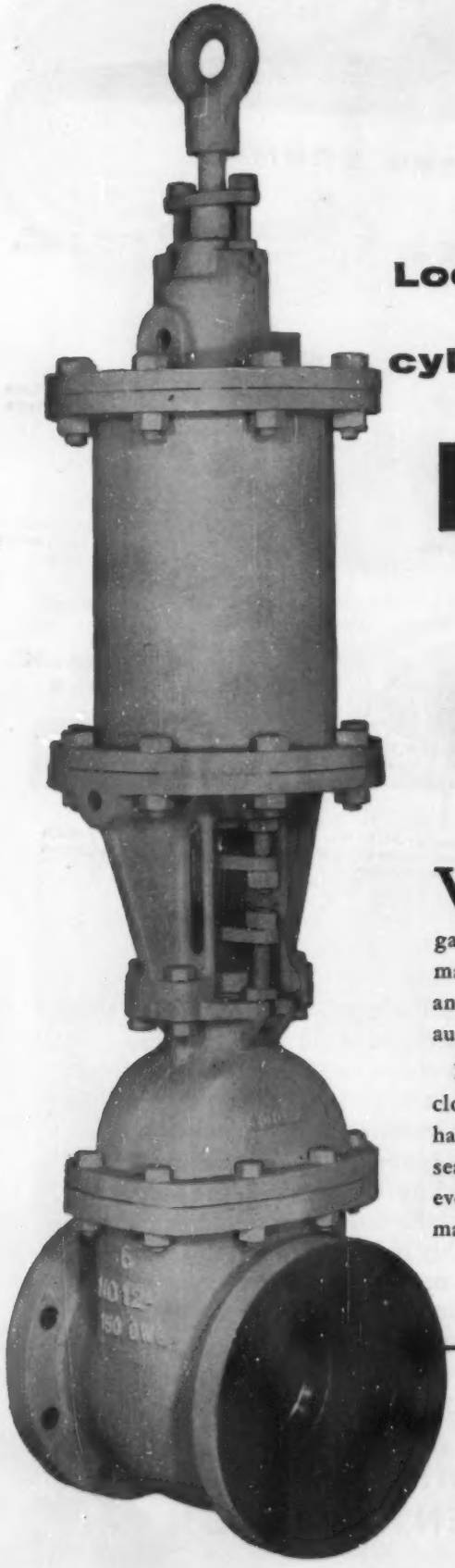
SAVE COSTS WITH ROAD FORMS

Self-aligning road forms save time and expense on highway paving, too. They will assure you of rapid form setting always true to line and grade. Road forms are available in heights of 8" or more and Airport forms in heights of 12" or more.

This "Complete Package" of forms can be used over-and-over again to build any of the cross sections shown above and *build them faster at a lower cost.* If curb, gutter and sidewalk building is part of your business, you can save time and material expense with these Blaw-Knox Universal steel forms. They are the only *completely standardized* forms that can be used interchangeably on many different jobs so you can take on a wide range of jobs with a low investment in forms. They are self-aligning, easy to set and strip and practically eliminate hand finishing. For complete details, see your Blaw-Knox distributor.

BLAW-KNOX

BLAW-KNOX COMPANY
CONSTRUCTION EQUIPMENT DIVISION
43 Charleston Ave., Mattoon, Ill.



Look how this TRADE DARLING MARK cylinder-operated gate valve

...SAVES TIME

...AVOIDS TROUBLE

...CUTS MAINTENANCE

WHERE frequent operation is required... especially in inaccessible locations... Darling cylinder-operated gate valves save time on each cycle of operation. The valve may be operated by air, oil or water. Movement is precise and completely controllable. Action can be either manual or automatic. Control can be either local or remote or both.

Darling's double disc gate valve principle assures tighter closing and longer, service-free life. The fully revolving discs have a wiping action that keeps seat faces clean. The discs seat in a different position with each cycle so that wear is evenly distributed. Available in a broad range of sizes and materials. Write for complete details.

DARLING VALVE & MANUFACTURING CO.
Williamsport 22, Pa.
Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

THE BUFFALO-SPRINGFIELD K-45 KOMPACTOR

How to select compaction equipment

The logical question to ask yourself when you are ready to buy new compaction equipment is: "Exactly what do I need the equipment for and how will I use it?"

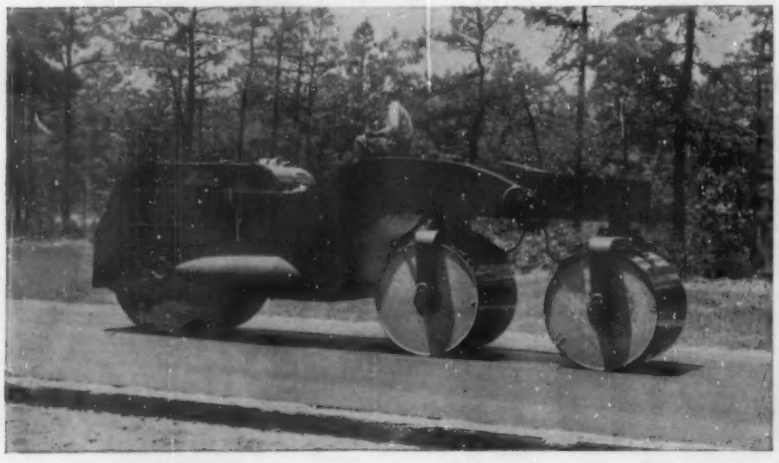
BASE FILL COMPACTION—This type of compaction demands equipment that will handle a wide variety of materials, give you the highest degree of compaction with the fewest passes. Buffalo-Springfield's revolutionary K-45 Kompactor is proving a real money-making answer for this type of work. It is self-propelled, relies on the "Interrupted Pressure Principle." All compaction effort is directed downward. Contractors testify they are meeting density requirements in one-fourth the time normally required with other compaction equipment.

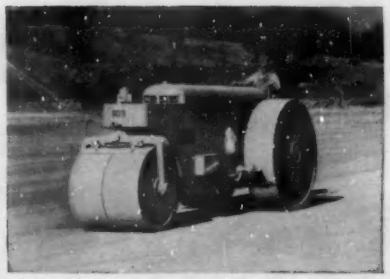
FINE GRADE FINISHING — Buffalo-Springfield offers six 3-wheel rollers, ranging in capacity from 5 to 15 tons, to handle the large variety of materials found in fills, subgrades and unfinished bituminous pavements. The variable-weight 3-wheel roller is ruggedly built for years and years of hard, maintenance-free work.

Buffalo-Springfield's thoroughly-proved 3-axle tandem "walking beam" roller provides up to 60% greater tonnage compacted per day in superhighway construction, airport and military establishment jobs where specifications are extra strict.

ASPHALT FINISHING — Two-axle Tandem Rollers are designed especially for all surface finishing jobs. Ranging from 5 to 16 tons, Buffalo-Springfield Tandems are used for heavy-duty highway and public works projects, and all types of finishing, maintenance and repair work. A wide selection of models for the biggest to the smallest jobs are designed for long-life and profitable operation.

THE BUFFALO-SPRINGFIELD KX-3 AXLE TANDEM





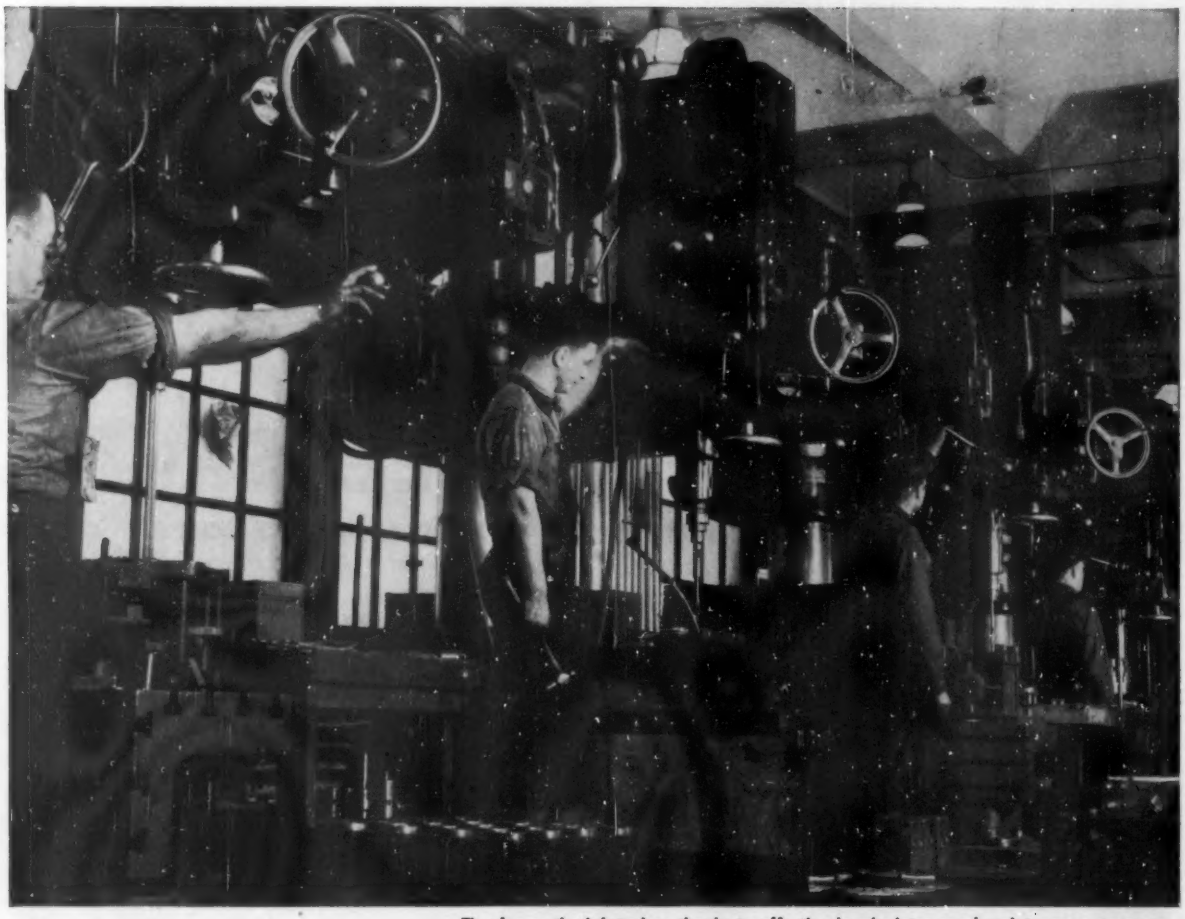
3-WHEEL ROLLERS

TWO AXLE TANDEMS

SHORT ROLLING JOBS—Buffalo-Springfield's 3-5 ton portable roller is widely used for rolling driveways, sidewalks, parking and playground areas, and for patching and light finishing jobs. It is highly maneuverable and portable from job-to-job. Write today for full information on the type of equipment you need—or see your nearest distributor for an on-the-job demonstration.

3-5 TON PORTABLE TANDEM

BUFFALO-SPRINGFIELD
Roller Division-Koehring Company
SPRINGFIELD, OHIO



They're on the job today, thanks to effective local winter road maintenance programs.

Ice on the roads, men on the job

Snow and ice struck late yesterday. Streets, roads and highways almost instantly turned treacherous. It looked bleak . . . for local plants' production schedules, for lost wages of workers kept off the job. It's often worked that way in the past.

But someone did a vital job through the cold hours last night and early this morning. You and your crews spread Columbia Calcium Chloride treated abrasives on those slick surfaces. Within minutes, safe travel was possible. Treated with this skidproofing chemical, abrasives bit into ice and packed snow with hungry vigor . . . didn't blow away before the surfaces became safe, as untreated materials do.

You saved time and expense in loading and spreading, too; Columbia Calcium Chloride kept your cinder and sand stockpiles loose, freeze-proof. And finally, you figured that each load of your treated abrasives covered fully three times as much actual surface as an untreated load used to.

Your stock of Columbia Calcium Chloride may be a little low today. Why not order an ample supply right now through your nearest Columbia-Southern district office? Any that remains after you've beaten winter's last attacks won't be wasted . . . you'll be using this versatile chemical soon enough to recondition unpaved roads.

Safeguard winter traffic with Columbia Calcium Chloride

Columbia Calcium Chloride is now also available in High Test Flake (95-98% $CaCl_2$ content). One 80 lb. bag of High Test Flake does the work of a 100 lb. bag of Regular Flake (77-80% $CaCl_2$).

COLUMBIA-SOUTHERN CHEMICAL CORPORATION

SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY

ONE GATEWAY CENTER · PITTSBURGH 22 · PENNSYLVANIA

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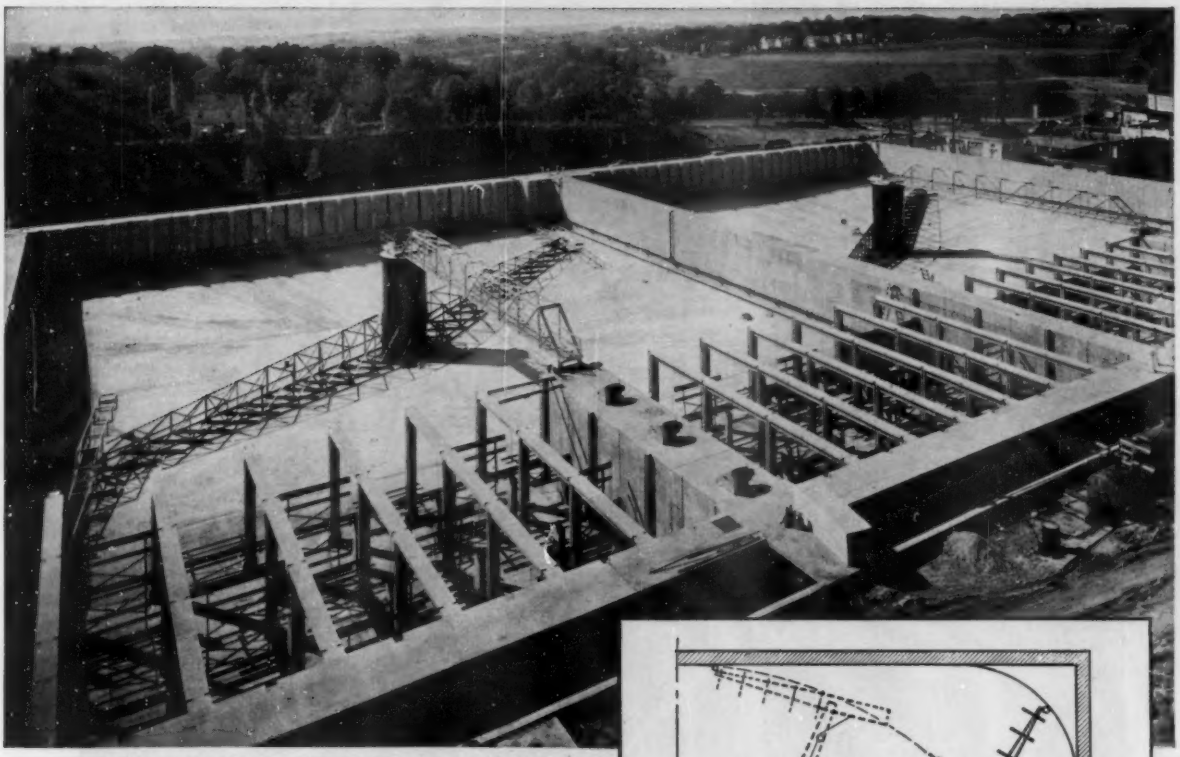
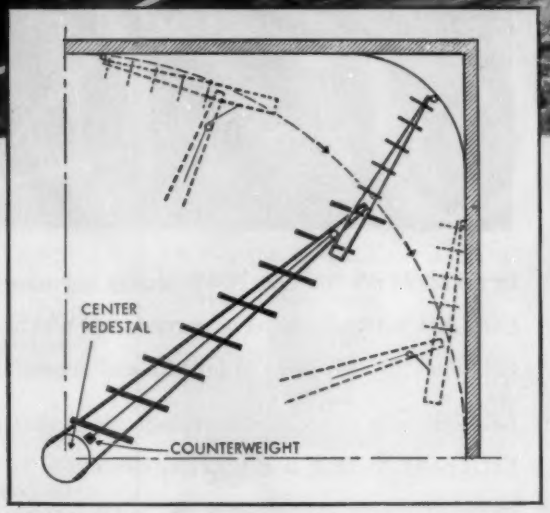
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

LINK-BELT supplies Baltimore's Ashburton filtration plant with

circular collection in square tanks



LINK-BELT "SC" CIRCULINE SLUDGE COLLECTORS are shown in two of four tanks at Ashburton plant. As arms revolve, scrapers move settled sludge toward sump in center of tank. Link-Belt Straightline slow mixers are in foreground. The Arundel Corporation, Baltimore, general contractors; Mr. B. L. Werner, City Water Engineer.



RAKES attached to collectors at each end have wheels which roll along metal curb around bottom of basin. Cable and counterweight assure constant rake contact against guide curb.

Design permits efficient sludge removal with economical tank construction

Chief advantage of rectangular settling tank design is the savings it offers in wall construction and piping costs. In addition, unit construction with slow mixers gives uniform distribution in the settling tank and prevents floc break-up. By choosing rectangular tanks with Link-Belt "SC" Circuline Collectors, the city of Baltimore, Md., was able to combine the benefits of both at its Ashburton water filtration plant.

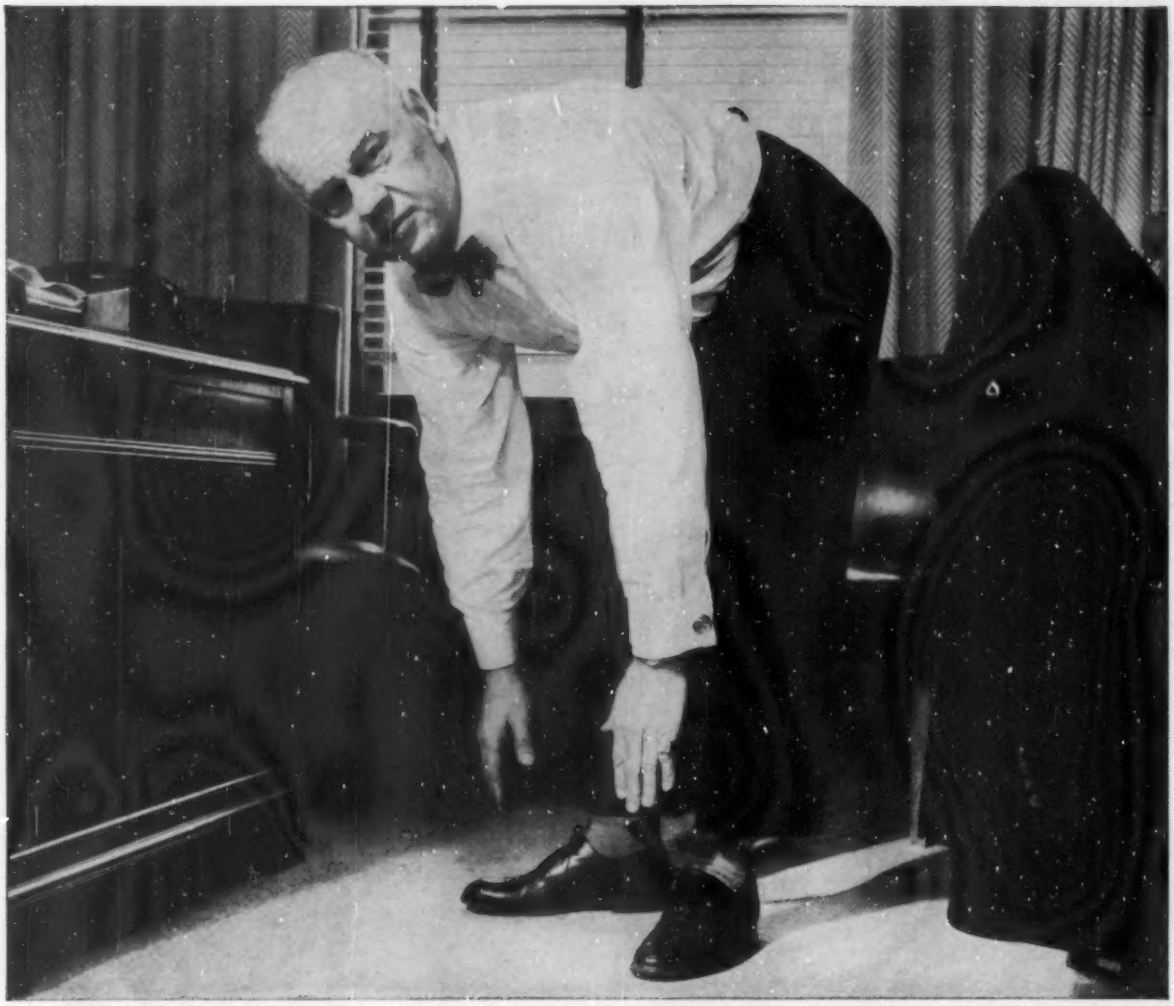
Link-Belt has pioneered many advances in sanitary engineering. Today, 35 years' background and a broad line of built-to-last equipment support every Link-Belt recommendation.

A call to your nearby Link-Belt office will put you in touch with a treatment specialist. He's ready to work with your consultants and chemists . . . bring you the finest in modern equipment, for any water, sewage or industrial waste treatment requirement.

LINK-BELT

SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.214



Time to consider your plant waste line, too!

How about the waste from your plant? Is it polluting streams... overloading municipal sewage treatment plants...causing annoyances to the public? Perhaps more important, is it wasting water and valuable materials?

There's a simple answer to the problem—CHAIN Belt's line of efficient industrial waste treatment equipment. Some units are "packaged"...complete in themselves and requiring only simple "piping-in" to plant waste lines. These units not only eliminate pollution... they can pay for themselves in the recovery of valuable materials from the waste...actually permit you to use water over and over again. It's an important factor in these days of water shortages.

If you're interested in turning waste into profit...saving water... send for your copy of Bulletin No. 315-92 for a quick, concise story of what CHAIN Belt Waste Treatment Equipment can do for you. Simply write CHAIN Belt Company, 4722 West Greenfield Avenue, Milwaukee 1, Wisconsin.

"Packaged" Verti-Flo in roofing products plant clarifies water for re-use and eliminates pollution.

Verti-Flo is a registered trade mark of CHAIN BELT CO.

CHAIN BELT COMPANY
Milwaukee 1, Wisconsin

HARVEY, ILLINOIS ENDS PROBLEM OF FLOODED BASEMENTS WITH

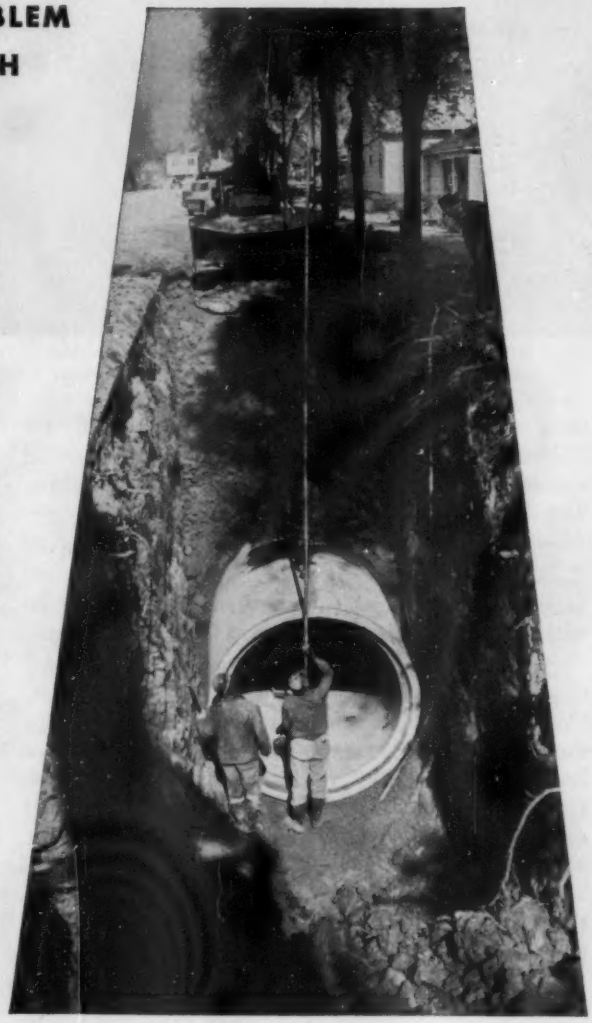
CONCRETE PIPE

To end a vexing problem of flooded basements in a large section of the city, Harvey, Ill. built a new relief concrete pipe storm and sanitary sewer. Both the old and the new sewer lines connect with the system of the Chicago Sanitary District at the north city limits.

The project used more than 40,000 ft. of concrete pipe 21 to 90 in. in diameter. It was financed by two bond issues—$675,000 in revenue bonds and $1,500,000 in general obligation bonds.

Like Harvey, hundreds of American cities depend on long-lasting concrete pipe sewer installations. These many systems have demonstrated concrete pipe's rugged durability, great structural strength, maximum hydraulic capacity, minimum infiltration and leakage, and unusual resistance to abrasion.

Concrete pipe sewers are moderate in first cost, require little maintenance and give lifetime service. The result is true ***low-annual-cost*** sewer service. Write for free 48-page booklet, *"Concrete Sewers,"* distributed only in the United States and Canada.

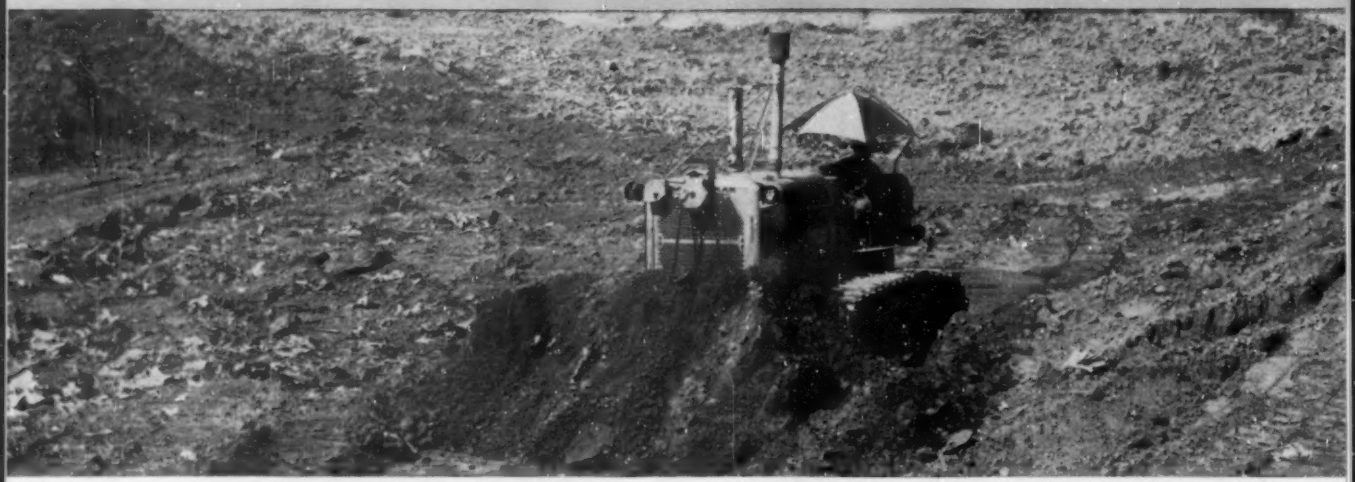


PORTLAND CEMENT ASSOCIATION

Dept. A2-89, 33 W. Grand Ave., Chicago 10, Ill.

A national organization to improve and extend the uses of portland cement and concrete . . . through scientific research and engineering field work

"This D9 is ideal for our operation"



On a site in Los Angeles, Cal., this rugged CAT* D9 Tractor with No. 9S Bulldozer is moving, compacting and covering rubbish on a sanitary landfill operation. The B.K.K. Co. of Los Angeles has the contract.

"This D9 is ideal for our operation," says Ben K. Kazarian, Jr., secretary of the firm. "We get good compaction from it and it is able to handle bulky material with ease. Operator's view is good and handling is easy."

Mr. Kazarian's D9 is new, but he knows he's going to get dependable service from it, year in and year out. "We've always been prejudiced toward Cat-built equipment," he explains, "because we get longer life and have less down time with it." On the same landfill operation, the B.K.K. Co. is using two Caterpillar D8 Tractors and a No. 212 Motor Grader. The tractors are handling about 3000 yards per eight-hour day.

The "good compaction" he talks about comes from the giant D9's great weight—more than 29 tons—on its extra-long-lived "water quenched" track shoes. The D9's ability to "handle bulky material with ease," as Mr. Kazarian puts it, is due to a number of features: the Turbocharged Cat Diesel Engine, which develops 320 HP at the flywheel; hydraulically boosted controls, and smooth constant power drive for cable and hydraulic controls. Available with either torque converter or exclusive oil clutch, the D9 is as easy to handle as many smaller tractors.

Let your Caterpillar Dealer *prove* to you that this "King of the Crawlers" can do more work at lower cost on *your* job.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE...
YOUR DEALER
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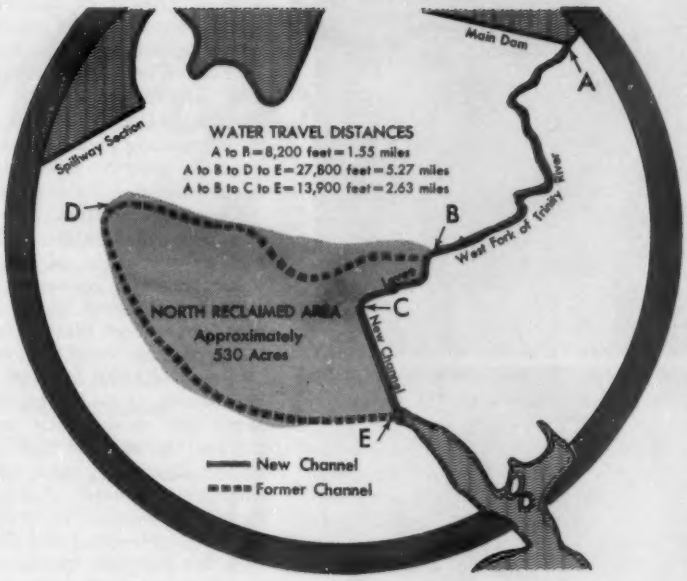
VOL. 88, No. 2
FEBRUARY 1957



● **IMPROVEMENT of the channel between Eagle Mountain Lake (top) and Lake Worth (bottom) cut water travel distance in half and permitted reclamation of approximately 530 acres of land.**

Shore Line Correction *Aids Evaporation Control*

UEL STEPHENS,
Director, City Water Department,
Fort Worth, Texas

FROM 1914 when the Lake Worth dam at Fort Worth, Texas was completed, until 1934 when the dam for Eagle Mountain Lake was developed just upstream from Lake Worth, the drainage area of Lake Worth was about 2150 square miles. A considerable part of the watershed was subject to land erosion of a major magnitude, and this caused extremely heavy siltation in the upper reaches of the lake area. As no topographical maps were prepared for the original lake area, it is impossible to determine the silt content of the lake with any degree of accuracy. After the two upstream reservoirs were completed in the early 1930's, siltation in Lake Worth almost ceased. At the same time, the water level was maintained so as to rise and fall within limits of about 24 inches. This was accomplished by periodic releases of water from the upper lakes. Since 1950 the water level in Lake Worth has been maintained at elevations between 589 and 591. This has been done by making water releases from Eagle Mountain Lake at intervals averaging about 14 days.

When water is released into Lake Worth as mentioned above, hundreds of acres of low land are flooded to depths from a few inches to two feet. These acres are covered with a dense growth of marsh grass, willows and other forms of semi-aquatic growth, which by transpiration consume hundreds of thousands of gallons of water. To eliminate or at least to reduce this loss of water was the object of straightening and shortening the river channel through the low areas and building low levees which would prevent the water from flooding some 500 acres of marsh land. The work was confined to two sections; one of which is located in the extreme north end of Lake Worth just below Eagle Mountain Lake and is designated as the North Area; the other section, the South Area.

In the North Area the work consisted of excavating a new channel some 2800 feet long, building several short dikes or "plugs" across old channels, building about 500 feet of low levees, installing a 36-in. pipe culvert with a flap gate on the outlet end and clearing log jams for several hundred feet down stream from the discharge end of the new channel. All of the work was accomplished with a rented bulldozer working on an hourly basis and city equipment spared from other jobs.

Result of Channel Correction

Before the channel correction, when water was released from Eagle Mountain Lake it travelled along the well defined river channel 1.55 miles to a point where the flow divided, part of it going almost due west over the 530 acres of marsh land, travelling a circuitous route for a distance of 5.27 miles. By the new channel route the water released at the lake would reach the same point by travelling only 2.63 miles and throughout its travel would be confined to a very narrow river channel 48 to 50 feet in width and 2 to 5 feet deep. As the water leaves the south end of the new channel, it is deflected to the east and south through some 350 feet of newly

● **SOUTH END of the new channel, located at Point "E" of diagram on preceding page. At this point a 36-in. drain with flap gate passes through the new levee.**

cleared and deepened channel which prevents spreading over some additional low areas.

Additional shallow overflow areas which could economically be eliminated were found a short distance to the southeast and down stream from the North Area. This section of Lake Worth is designated as the South Area. To prevent flooding the South Area it was necessary to construct two low levees. The south levee is about 1000 feet long extending from the south shore westerly to a small island. The north levee is some 3000 feet long extending in a northerly direction from the north side of the island to a point on the shore of the lake. By the construction of these two levees the water is confined in a narrow section of the lake east of the levees and some 300 acres of low marsh land was reclaimed from alternate flooding and drying out. This entire area was covered with a growth of marsh grasses.

S. M. Freese of the consulting engineering firm of Freese and Nichols of Fort Worth in a report to the City on silt removal from Lake Worth in 1955 used the following in computing water losses from heavily growth covered shallow marsh areas of Lake Worth:

Direct evaporation, 3 ft. per annum and transpiration, 4 ft. per annum, or a total loss of 7 ft. per year. R. L. Lowery in his report on reservoir evaporation losses indicated that for the Fort Worth area the net loss would be about 4.6 feet.

Based on the findings of these authorities, it is reasonable to assume that evaporation and transpiration losses from the two areas under discussion, and considering they are alternately flooded so that they are subject to water losses about 75 percent of the time, would be 6 feet per year. The annual water loss from the 830 acres would be 4980 acre feet of water or 1,623.48 million gallons which, if valued at only 1¢ per 1000 gallons, would be worth $16,234.80. The expenditure of about $10,000 for the improvements appear to be well justified.

New Type Sign for Kansas Turnpike

PORCELAINIZED aluminum extrusions and raised reflective lettering have been combined for the first time to double the life expectancy of highway signs on the new Kansas Turnpike.

Ordinary highway signs must be refinished or replaced every five to eight years. The Kansas Turnpike signs, installed by Federal Sign and Signal Corporation, are expected to last for as long as 15 years without recoating. The Turnpike sign program involves $400,000 worth of highway signs and markers.

Approximately 1,500 of the dark green porcelain signs will guide motorists along the 236-mile Kansas Turnpike, which will form a major link in the proposed Maine to California turnpike system. The Kansas Turnpike extends from Kansas City, south through Topeka and Wichita to the Oklahoma border.

The process of porcelainizing extruded aluminum has been perfected only during the past year. The process is delicate because enameling ovens must be heated to within approximately 25 degrees of aluminum's melting point to achieve the required result.

Raised lettering mounted on aluminum pegs is a further innovation created by Federal engineers. The letters will be spaced away from the porcelain background to prevent accumulation of snow or dust. All letters, numerals and borders on the signs and mile markers will be demountable for easy maintenance.

A silver reflective sheeting was chosen to coat the letters, numerals and borders to contrast with the non-reflective porcelain backgrounds for the greatest possible legibility.

In addition to the signs the Turnpike will use 30,000 delineators, placed in four continuous lines the length of the Turnpike. The delineators will be amber-colored at interchange and service areas, and of clear crystal elsewhere. Plastic prismatic lenses of the delineators are set in etched aluminum to confine the reflective qualities to the lenses themselves.

● **PORCELAINIZED aluminum and raised letters are used for Kansas Turnpike signs.**

Major NEW OUTFALL SEWER to SERVE LOS ANGELES

JAMES KESLER,
Project Engineer,
Hyperion Engineers
Los Angeles, California

CONSTRUCTION has begun on eight miles of 114-in. outfall sewer costing an estimated $12,000,000 and needed because of the unprecedented growth of the Southern California area. In Los Angeles, the two existing outfalls now serving the City have become seriously overloaded. The Central Outfall Sewer, which was constructed in 1908, is approximately 6 miles long and has an inside diameter of 4 feet. The North Outfall Sewer, which was constructed in 1924, expanded the outfall sewer system to 55 miles in length and to a maximum diameter of 10 feet. Both outfalls are now flowing again near peak capacity and a new relief sewer is urgently needed.

In April, 1955, the voters of Los Angeles overwhelmingly approved a $60,000,000 bond issue to finance the construction of badly needed expansions to their sewerage system. In order to facilitate design of the expansion program, the City of Los Angeles retained the services of Hyperion Engineers, a joint venture comprised of the Los Angeles engineering firms of Holmes & Narver, Inc.; Daniel, Mann, Johnson, & Mendenhall; and Koebig and Koebig, to prepare construction drawings and specifications for approximately two-thirds of the proposed work. The proposed relief line, known as the North Central Outfall Sewer, is a major part of the design being done by the joint venture.

It was clear that the new sewer should relieve the existing outfall system at a point approximately 8 miles northeast of the treatment plant and should deliver its flow to the City's Hyperion Plant. However, the exact alignment of the sewer between these points could not be determined until extensive subsurface explorations were made. Several possible alignments of the sewer were selected and a comprehensive geological survey was made to locate areas of faulting and subsidence along these routes. Field inspections of the area were also made and faults located by observations of the general geological structure. In addition, 28 test holes were excavated to determine the general soil and ground water conditions in the vicinity. Records of subsidence were available from a series of precise bench marks installed and periodically checked by the City of Los Angeles and the United States Coast and Geodetic Survey.

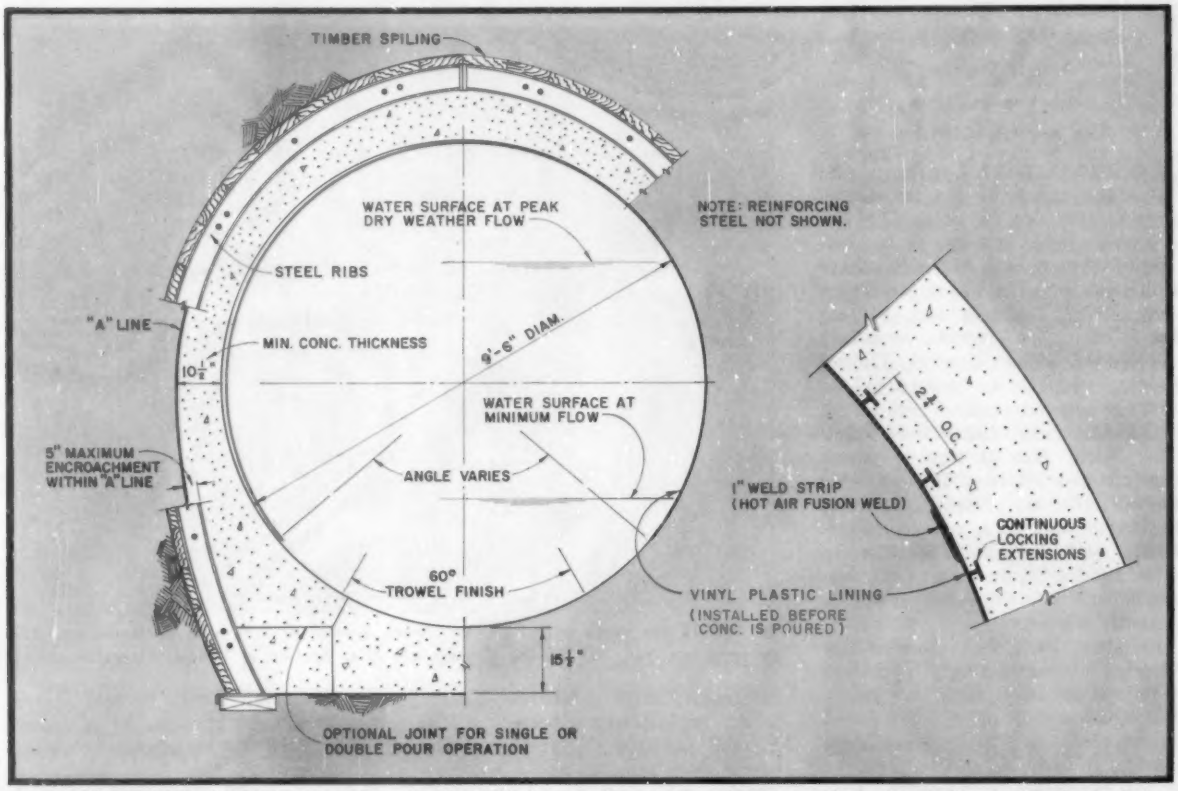
● **INSIDE the north portal of the tunnel, typical of 5.4 miles of tunneling. Rib supports are 6-in. WF 20-lb.; timbers are 3-in. Section is 114-in. diameter circle.**

The most direct route for the sewer consisted of a 7½-mile tunnel through the Baldwin Hills. These hills rise to an elevation about 1500 feet above sea level and form one of the major oil fields in the Los Angeles area. The ground elevation at the upstream end of the outfall is at an elevation only 80 feet above sea level and portions of a sewer constructed on this alignment would be over 1400 feet deep. The geological survey indicated several active faults traversing the Baldwin Hills and major subsidence has taken place. For these reasons, the selected route for the North Central Outfall does not pass through the Baldwin Hills but, instead, is located along the north and west sides of the hilly region. In this manner the active faults and areas of subsidence were avoided although the final route is approximately 3000 feet longer than the direct alignment and right-of-way somewhat more costly. The final route is 8.0 miles in length and consists of 5.4 miles of tunnel and 2.6 miles of open cut construction.

After selection of the final route for the North Central Outfall an additional 54 test holes, averaging 75 feet in depth, were excavated along the proposed sewer. Five hundred

undisturbed soil samples were collected between elevations 35 feet above and 15 feet below the proposed invert; and 75 percent of these were tested to determine moisture, density, direct shear, and particle size. Ground water was chemically analyzed for chloride and sulfate content.

Of these holes, five were provided with 3-in. perforated pipe extending from top to bottom of the test boring so that a current record of water levels could be obtained during the construction phase of the project, thereby allowing the Contractor to anticipate any water problems that might develop. The soils program required approximately 6 months to complete and resulted in design data for lateral and vertical pressures, shear strength, bearing strength, ground water conditions, and other general subsurface conditions. The subsurface conditions revealed by this extensive investigation also permitted a lump sum type of construction contract.



● **CROSS-SECTION of 114-in. sewer line. At the right is an enlarged view showing method of attaching vinyl plastic lining.**

Design Data

The present peak capacity of the outfall system serving Los Angeles is 650 cfs, of which 540 cfs is carried in the North Outfall Sewer and 110 cfs flows in the Central Outfall. When this flow is being delivered, the existing lines are surcharged. It is estimated that the peak dry weather flow from the area tributary to the treatment plant will be 930 cfs in the year 2000 and, therefore, the capacity of the outfall system should be increased at least 280 cfs. Both existing outfalls will be used to meet future requirements in conjunction with the proposed sewer.

In order to provide sufficient air space in the sewer during periods of high flows, the new line was designed to provide enough capacity to relieve the existing outfalls of a portion of their present flow and to handle the increased flow in the future. To accomplish this the North Central Outfall has been designed for 354 cfs when the line is flowing at three-fourths depth.

The water surface at three-fourths depth in the North Outfall Sewer at its junction with the North Central is 83 feet above sea level. The water surface as it enters the treatment plant must be maintained below elevation 36 so that the full capacity of the North Outfall can be maintained and the weirs in the headworks building preclude lowering the hydraulic gradient at the plant below elevation 34. With these three elevations as controls the allowable head loss in the proposed sewer is approximately 48 feet. The new outfall was therefore sized to handle the future peak dry weather flow of 354 cfs at three-fourths depth with $n = 0.014$ in the Manning formula. This coefficient of roughness was selected after investigation of several sewers of comparable size in the Southern California area. It was found that "*n*" values varied from 0.012 to 0.018 but the most representative figure was that selected for final design. These hydraulic computations resulted in the selection of a 114-inch inside diameter pipe for most of the line.

Although the available head loss allowed design of a gravity line there were two low spots in the system that required use of inverted siphons. Future minimum flows in the North Outfall just upstream from the proposed diversion into the North Central were determined and the siphons designed to insure that a minimum velocity of 1.5 cfs would be maintained. Due to the large diameters of the proposed siphons, 90-inch and 102-inch respectively, multiple barreled structures were not deemed necessary.

Provision is also made in the North Central Outfall to divert flow

back into the North Outfall Sewer for balanced or controlled loading of the two sewers, particularly for low flows in order to maintain the highest possible velocity during these low flows and thereby minimize any sedimentation. A 90-in. x 60-in. venturi meter is located on the North Central Outfall in keeping with the City's policy of metering flows in all major outfalls and this provides necessary data for accurate flow controls in the two lines.

In order to speed construction the North Central Outfall was designed as two separate projects. Unit I consists of the lower half of the line and is essentially a 20,000 foot tunnel. Unit II is the remaining portion of the 8 mile sewer and consists of approximately half tunnel and half open cut construction. The tunnel section is designed as a monolithic reinforced concrete arch for 2500 psf vertical load and 1000 psf horizontal load. The inside section is a 114-in. diameter circle and the concrete details permit of either a single or double pour operation. The bottom 60 ins. of the inside is required to be steel trowel finished for improved abrasive resistance.

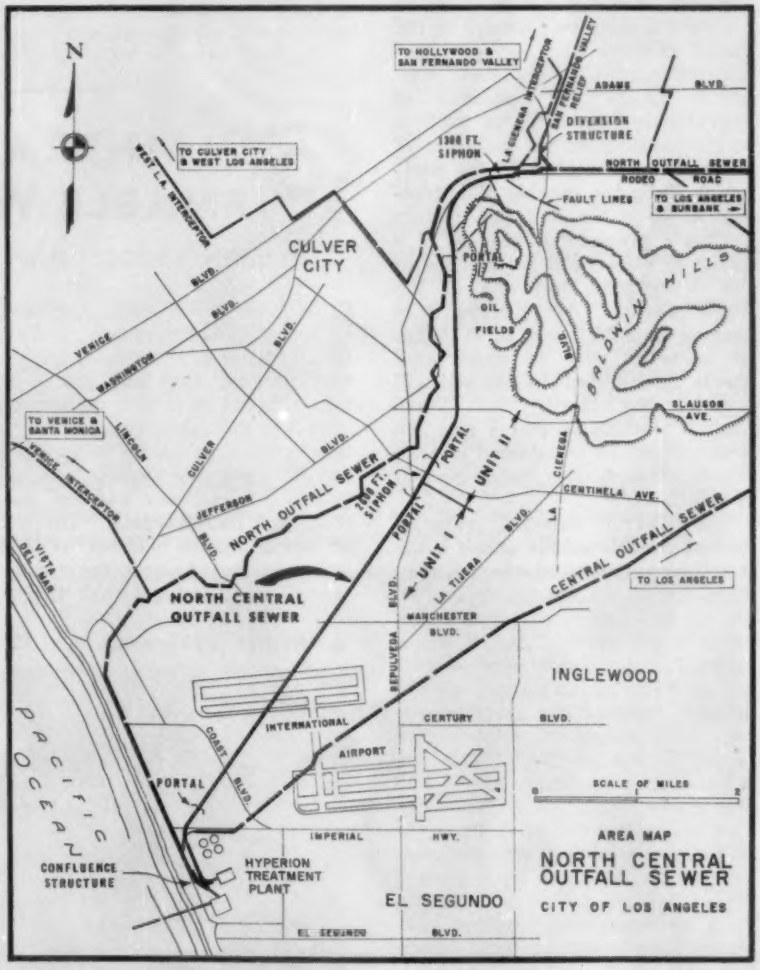
In view of the uniformity of the sandy substrata revealed by the soil investigation, the method and extent of supporting the tunnel excavation has been made the responsibility of the Contractor, and the lump sum type of contract adopted. It is expected that the sandy material will close in on the tunnel supports rather rapidly upon excavation and that overbreak must be minimized to avoid subsidence of the ground surface. In addition, the usual grouting program that normally follows concrete lining in a hard rock tunnel is expected to be ineffective in this instance as vibration and other movements will cause most voids to have become self filled long before grouting could be undertaken. These conditions resulted in specifications for the tunnel sections that require well controlled mining operations, with no blasting and any grouting to be done as extra work.

The open cut sections were also designed as monolithic reinforced concrete arches for the usual trench and highway loadings for underground conduits. These sections are, like the tunnel, circular inside with the outside to be formed or poured against the trench sheeting up to the spring line of the arch. For both tunnel and open cut construction, a precast reinforced concrete pipe may be used as an optional alternate to the cast-in-place design.

Possibly the most unique feature of the proposed outfall is the elaborate provision being made for future inspection, maintenance and cleaning operations. To allow inspection by boat, cleaning and maintenance of the sewer, twelve large structures are provided. These are 17 feet square and are located approximately 5000 feet apart and at each end of the siphons. The City of Los Angeles' Bureau of Sanitation plans to conduct periodic inspections of the sewer so that cleaning and other routine maintenance operations can be performed when needed. In this manner it is felt that useful life of this vital link in the outfall system will be materially increased.

Long and careful consideration was given the problem of corrosion of concrete by hydrogen sulfide gas. Many large sewers in the vicinity were inspected and it was noted that corrosion had taken place in varying degrees. By far the most seriously affected sewer was the North Outfall where corrosion had progressed at several locations to the point that actual structural failure was imminent. Careful study was given the probable causes of sulfide attack and three remedial measures were incorporated in the North Central Outfall. These design features are: (1) eliminate wherever possible areas of excessive turbulence to minimize release of hydrogen sulfide into the sewer atmosphere; (2) provide adequate forced ventilation to remove hydrogen sulfide from the sewer atmosphere and prevent oxygen depletion; and (3) provide an acid resistant lining on all portions of the sewer located above the minimum water surface.

The elimination of excessive turbulence was accomplished by providing smooth surfaces within the sewer, using large curves for both horizontal and vertical changes in direction, and by properly designing transitions and junctions. In general,



● MAP shows location of new sewer which relieves load on older parallel lines.

the minimum radius of curvature in a horizontal plane is 400 feet and long vertical curves were provided at all significant changes in grade. Four areas of possible turbulence remain. They are located at the upstream entrance to the siphons and at the junctions with the existing North Outfall Sewer. These areas are protected by a vinyl plastic lining and, to some degree, by the ventilation system. Turbulence was an important consideration in a hydraulic model study undertaken for the confluence structure between the North Outfall and North Central Outfall.

The forced ventilation system serves a dual purpose. Although a difference of opinion exists regarding the degree of protection a ventilation system provides against sulfide attack, it is generally accepted that some benefits are obtained and this was one reason for installing the exhaust facilities. Second, and possibly most important, the suction fans located at the downstream terminus of the sewer are sized to maintain a negative pressure in the outfall thereby eliminating objectionable surface odors that commonly plague the operators of sewerage systems. This in itself is ample justification for inclusion of the ventilation system in the project. A 50-hp fan, capable of delivering 20,000 cubic feet per minute against a pressure differential of 9 inches of water, will be installed at the downstream terminus of the North Central. Air jumper lines ranging from 36 inches to 48 inches in diameter will be constructed across the inverted siphons and will connect the North and North Central Outfalls so that a negative pressure can be maintained in both sewers throughout a major portion of the line.

The third remedial measure against possible sulfide attack is the installation of a vinyl-plastic lining at all points in the sewer located above the low water line. This material has been in use in sewers in the Los Angeles area since 1947 and is giving satisfactory service as an acid resistant and durable material. Based upon a minimum flow of 75 cfs, the low water line was calculated to be approximately 2.8 feet above the invert of the sewer. The lining was extended 12 inches below this minimum water surface resulting in the upper 260 degrees of the outfall being covered. The 12-inch freeboard was provided since inspection of existing lined sewers indicates that sulfide attack is greatly increased in areas where the water surface intermittently falls below the protective lining, and very often minimum flows have not built up to the magnitude expected.

The 1955 Bond issue, under which construction funds for the North Central Outfall were provided, placed a strict limitation on the monies available for each phase of the program. Preliminary estimates indicated that the inclusion of a vinyl-plastic liner throughout the entire length of the sewer might result in a construction cost in excess of that allocated. Consequently, an alternate design was prepared which incorporated the liner material only at points of maximum turbulence and for a limited distance downstream from the inverted siphons. In the remainder of the outfall approximately 2-inches of additional concrete thickness was provided to give longer life to the structure. The alternate bid was not considered as an equal but, in the event the construction cost for the lined section was in excess of the available funds, the additional concrete would be acceptable.

On June 18, 1956, the Los Angeles City Board of Public Works officially awarded the contract for construction of the North Central Outfall Sewer, Unit I, to the Arundel Corporation, L. E. Dixon Company, and Kemper Construction Company, a Joint Venture. The award was made to the low bidder at a lump sum price of $6,196,691. This price included installation of vinyl-plastic lining throughout the entire length of sewer. The low bid for the basically unlined alternate was submitted by the same three contractors and was approximately 4 percent below the value submitted for the full lined section.

Construction drawings and specifications for Unit II of the North Central Outfall are completed. This design has been prepared on the basis of a full lined section with an alternate design utilizing additional concrete thickness in lieu of vinyl-plastic lining. Bids for this unit will be called in the near future. It is anticipated that the North Central Outfall Sewer will be placed in operation by the summer of 1958.

INCINERATOR SOLVES BURNABLE WASTE PROBLEM

MELVIN WALDSCHMIDT, Executive Director, South Euclid, Ohio

PROPER STORAGE, collection and disposal of garbage and refuse is a direct responsibility of every municipality and public officials should give these matters the attention they deserve. Control of this problem is a basic requirement for the prevention of nuisances and unsightly conditions and for good municipal housekeeping. The City of South Euclid believes in these principles and operates its sanitation service in accordance with them.

Since control of refuse begins with storage, the city has appropriate regulations for its residents. The refuse is separated and stored on the basis of burnables and nonburnables. Storage is in containers of non-absorbent material of a size convenient for handling. Collection is provided for garbage, waste paper, cardboard, grass, leaves, hedge clippings, brush, wooden crates and all combustible household refuse. The average weight of

● **INCINERATOR has capacity of 100 tons, with two 50-ton furnaces and one stack.**

● **FURNACES are charged directly from the trucks after weighing. Men are required to wear safety belts when charging the furnaces or working near charging holes.**

refuse is about 250 lbs. per cubic yard.

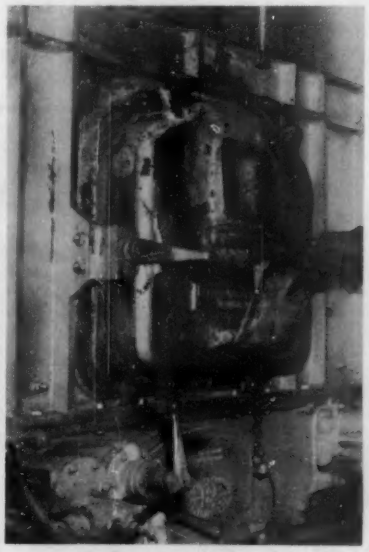
All collections from the 7500 homes in the city are by city forces. Collections are made once a week. A total of five trucks are used; three of these are closed body trucks used for garbage and burnable wastes; and two are open body trucks used for collecting non-burnable material. Collection requires 19 men.

Non-burnable material is hauled to the dump area where a modified sanitary fill type operation is carried out. All burnable waste is hauled to the municipal incinerator, a 100-ton capacity installation consisting of two 50-ton units side by side, using one stock. It is operated on a 6-hour 5-day a week basis.

The incinerator is located adjacent to a residential and business section. This location shows that a properly designed and carefully operated incinerator is not necessarily a nuisance or a detriment to any area. Our plant, which cost approximately $200,000, was put into operation in July, 1955. The design of the hearths and combustion chambers insures complete high temperature destruction of combustible material. Only inert gas is discharged by the stack to the atmosphere during normal operation.

This is a direct charge plant, with a charging floor, stoking floor and ash tunnel floor. The rectangular type burning units were designed and built by the Pittsburgh-Des Moines Incinerator Co. The stack is 80 feet high above the base elevation and 5 feet 10 inches inside diameter at the top and also inside the target wall at the base.

On the charging floor is a Howe scale where trucks are weighed and a record kept to determine the daily tonnage of refuse burned. Other facilities include a P. A. system to the stoking floor. Brown Instrument recorders, drinking fountain and toilet facilities, including hot and cold water, and shower stall.



● **BURNING control, stoking and dumping are handled on stoking floor.**

The stoking floor is equipped with forced air fans, and controls, P. A. system to charging floor, controls for the mechanical grates, valves for water quenching jets into ash pit, dampers to control each unit, stoking tools and the pyrometer for temperature readings.

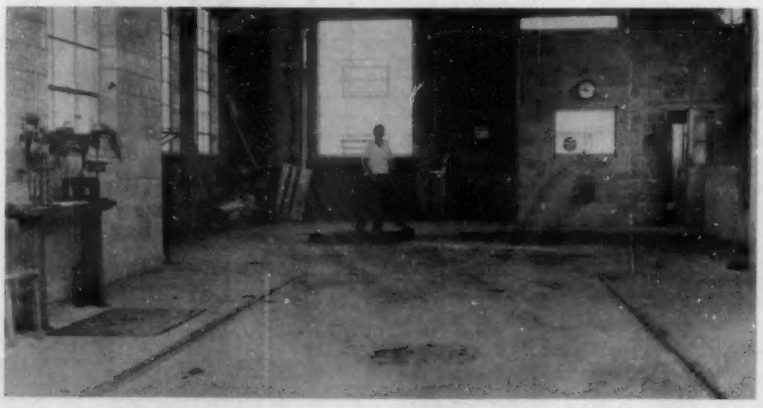
The ashes are discharged from the furnace directly into ash hoppers which are located in the ash tunnel floor and removed daily by dumping directly into an open body truck after quenching. The hydraulic tank, pumps and motors are also located on this floor.

The furnaces are charged directly from the trucks after they are weighed by the collectors. Each man is required to wear a safety belt to insure his safety when working around the charging hole.

Operation of the plant is by two men. The charging floor operator weighs the trucks, records the weight and directs driver to the unit which is to be charged. He also opens and closes the charging gates accordingly. The stoking floor operator does whatever is necessary to control the burning of the refuse, as manually stoking and dumping the grates, dumping and removing the ashes from the plant once each day.

Either furnace cell may be charged or cleaned without interfering with normal operation of the adjoining cell. The mechanical stoking and dumping grates reduce man hours and labor.

During May, 1956, 668.37 tons of waste refuse was incinerated at a total cost of $1.81 per ton. This cost figure does not include a nominal charge for electricity, gas, water or depreciation of plant. The cost as stated does include wages, superintendent's salary, equipment rental, supply costs and repair parts.



● **VIEW of charging floor, showing two charging holes, office and weighing scale.**

CHARGES for Extending Water Mains to Subdivisions and Developments

IN A QUESTIONNAIRE recently sent to engineers and superintendents in charge of municipal water works, the question was asked: "What method does your city employ in paying for extending water lines into subdivisions and developments?" About 1600 replies, in all, were received, but not all of them answered this question clearly.

In tabulating the more definite responses, it was found that in 8 percent of the cases, the city paid the total cost; in about 39 percent of the cities, the developer or property owner was required to stand the full expense; and in 53 percent, the cost was divided according to various formulas. The data are summarized in detail by area, state and city in the following discussion.

New England

Maine—Auburn requires a gross return of 6 percent on its investment. Houlton allows $400 per new customer. Livermore Falls and Winthrop require an 8 percent return. In Waterville, a return of 8 percent for 10 years is required, less any revenue from services on the extension.

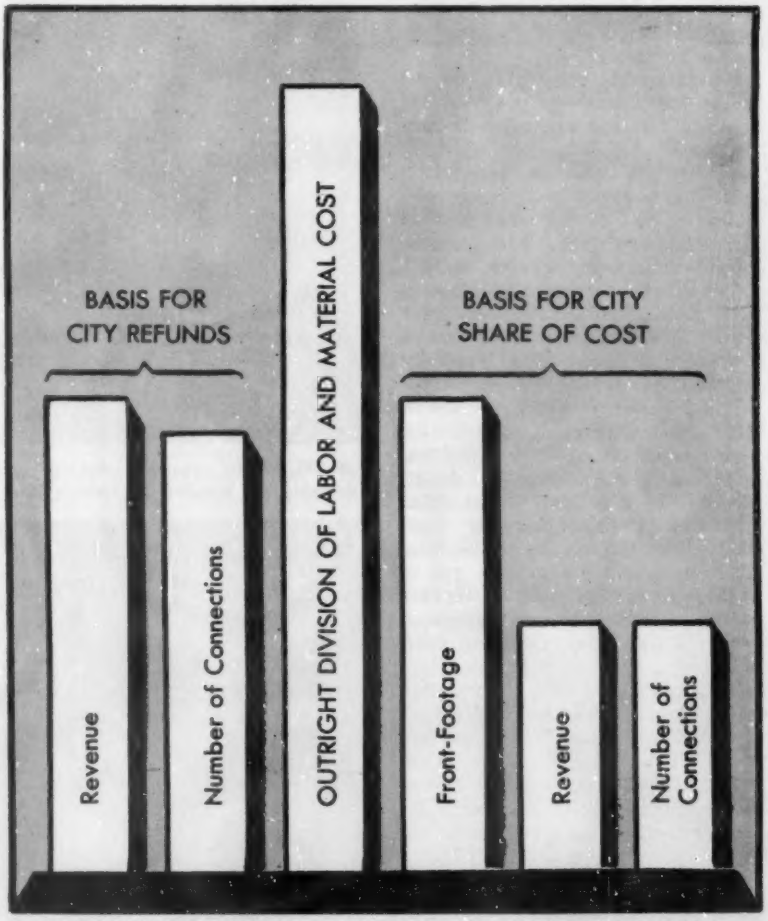
New Hampshire—Berlin finances 100 ft. only; Hanover also provides 100 ft. per new customer, and on the remaining length the customer pays 7½ percent on construction cost for 20 years. Lebanon has been paying all costs but this is in the process of being changed.

Vermont—Brattleboro requires 10 percent on the investment for 10 years.

Massachusetts — Boston installs mains only if foundations are poured and rebates 25 percent of the cost over a 5-year period. Falmouth requires a 9 percent guaranty. Milford requires the developer to pay the cost but refunds as connections are made so as to insure a fair return on the investment. In Southbridge, the developer pays on a refundable basis. Springfield charges $3 per ft. Taunton uses a guaranteed income basis while Woburn extends and pays for the lines. Acton requires a 4 percent return; Chelsea makes no charge; and in Dudley it is 2/3 contractor and 1/3 town. Haverhill charges 50 percent to the contractor. The developer does the trench work in Marblehead. Saugus supplies hydrants, but in Stoughton, the developer pays for everything. Seekonk requires a 10 percent guarantee for 10 years or until income is equivalent to 10 percent. Yarmouth also uses a 10 percent basis. In Williamstown, the contractor pays all and is reimbursed $100 for each bona fide customer.

In Hopkinton, owners in new developments pay the entire cost. On accepted streets a formula is being given a year's trial. This involves payment of 20 percent of the cost by owners of new houses. For all others the 20 percent figure is reduced by a factor: house evaluation x years house owned by same family x 0.5 percent. A twenty-year limit is placed on the ownership period.

Connecticut—The developer pays 10 percent per year of the extension



● QUESTIONNAIRE replies showed several formulas used by cities to divide costs.

cost, less the water rents, in New London. Derby charges 50 cents per ft. per year for 10 years. In most of reporting cities, the developer pays all costs. Southington reports: "The developer pays the entire estimated cost of the extension in advance. Installation is made by the Department and an adjustment is made when the exact cost is computed. A refund is made, equal to 25 ft. of main, for each house connected and occupied, in ten annual payments. Under this plan, the average developer will pay about ⅝ of the cost of the extension."

Rhode Island—Newport returns to the contractor a percentage of gross revenue for a period of years.

Middle Atlantic

New York—Warwick pays for all extensions; Ilion splits, 2/3 by developer and 1/3 by water department. In Haverstraw, there is a refund for each connection made, the developer paying the initial cost. If 10 percent of the cost of the project is realized by the sale of water, Oneida will put in the system at no cost to the developer. This plan is now under reconsideration. Peekskill requires a 6 percent return. In Watertown, the city and each side of the street divide the cost three ways. Most of the 48 cities replying said that the developer must pay; however, Port Jervis extends at its own cost.

New Jersey—In most cities, the developer pays all costs, but Clifton refunds for each house; East Paterson gives the first 200 ft.; Elizabeth and Franklin refund 3½ times the revenue; Flemington refunds as each unit is completed. Ridgewood charges $4 per foot.

Pennsylvania—Replies were received from 47 cities. Ambridge refunds 2½ times one year's revenue. Bloomsburg refunds as homes are connected. Butler has a refundable deposit agreement; Corry lays 100 ft. of line for each house built. Refund-deposit agreements are used by Gettysburg, Grove City, Hanover, Latrobe, Lebanon, Wilkes-Barre, Milton, New Castle, Warren, Bangor, McDonald and Uniontown. Hometown charges 10 percent on actual cost for 10 years. Sayre extends 100 ft. free.

East North Central

Ohio—Reports were received from 58 cities. Alliance refunds the developer the cost of 50 ft. of line for each new connection. The developer pays all costs except for hydrants in Bucyrus. Gibsonburg has a $45 top fee only; in Hillsboro, costs are split 50-50. In Troy, the developer installs sizes through 6-in. Inside the city, consumers pay for a 4-in. main, the city the balance. Coldwater pays 25 percent of the cost. Massillon has a refund basis. Rittman charges $3 per front foot. In most other cities, the developer pays all, in some cases "most" of the costs.

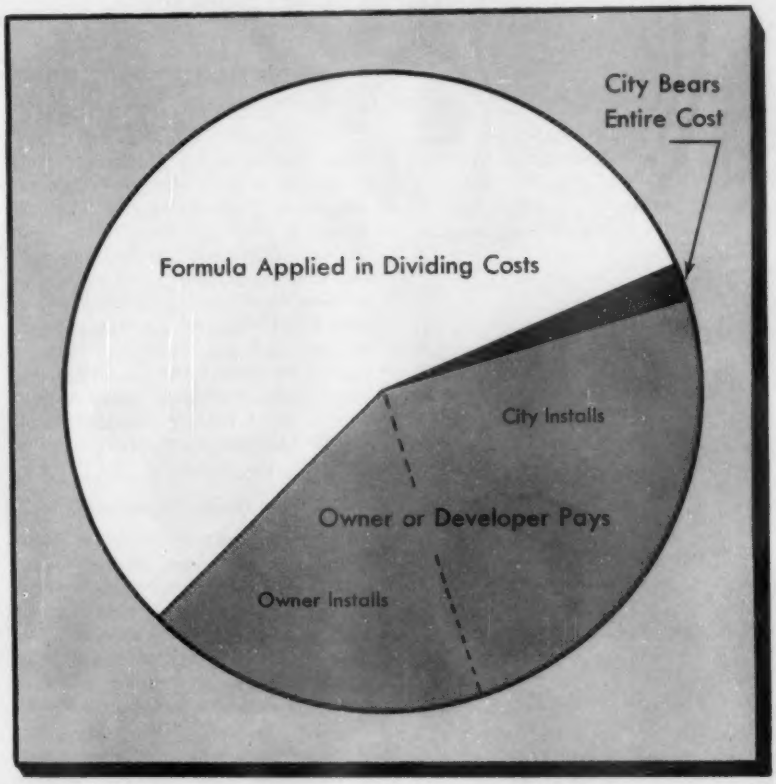
Indiana—Aurora, Shelbyville and Crawfordsville use a 6:1 ratio. Gary will pay 6 times the estimated annual revenue; No. Manchester returns 6 years' income. Plymouth plans to get costs back in 4 years. Nappanee has a 5-year extension plan. In Terre Haute the developer pays the entire cost of the extension, including services and meters. The size of pipe is dependent on the demand, and the developer pays even if 6-in. or 8-in. pipe is required; for larger than 8-in., the company absorbs the difference between 8-in. and the size required. The contract life is 8 years. A credit is allowed the developer for each connection made to the extension, equivalent to 6 times the estimated annual revenue.

On some extensions in Valparaiso, the customers pay for the line by deposit; after a set period, if the revenue is substantial, the first cost is refunded. Customers outside the city limits on the pipe line to the city pay for the service installation and an extra 10 percent charge on billings.

Illinois—Reports were received from 49 cities, in most of which the developer pays, occasionally on some modified plan. Champaign makes refunds based on revenue; Galena furnishes the pipe, the developer pays the cost of installing it. Lawrenceville refunds 50 percent of the cost for each connection. Marion pays for 50 ft. of line for each tap. Quincy has a deposit and refund basis. Rockford charges $4 per ft. for 6-in. and $5 for 8-in. or larger. Carbondale charges $1.75 per front foot, plus tap time and material, plus 15 percent.

Michigan—Detroit charges $1.15 per front foot and Escanaba $1.50. Marshall repays the developer over a period of time. Rogers City is now setting up a method. So. Haven provides 100 ft. of free main per customer. Dearborn contributes 10 percent of the cost; Essexville and Menominee, 15 percent; and Petoskey 50 percent. In Hillsdale, the Water Department installs the water mains without cost if the developer installs sewers. Negaunee

(*Continued on page* 156)



● **WHO PAYS for water main extensions? Usually it's the ultimate owner or user.**

CONSTRUCTION TRAINING AIDS

N. E. CORNELIUS, Assistant Construction Engineer, and

O. C. HINTON, Audio-Visual Specialist,

Division of Highways, California Department of Public Works

Color illustrations courtesy "California Highways and Public Works"

WITH ENGINEERS in very short supply, the California Division of Highways is engaged in an intensified program of training present and new employees to meet the demands of a greatly expanded highway planning and construction schedule. In addition to facing a shortage of personnel with highway training and experience, there are other important training considerations, such as keeping present employees advised of improved practices and procedures affecting their work. There are also the needs of rotating personnel between departments, and of training new employees in the several specialized functions of this division.

Visual aids play an important part in any modern training program. Many aspects of highway work can be explained clearly and quickly on a group basis only through visual illustration.

As early as 1950, this division had settled on color filmstrips, with accompanying disc recordings, as the major series of training aids to supplement manuals, plans, specifications and other available instructional material. Filmstrips were selected over movies for several reasons. First there was the matter of cost—not only for the initial film—but also for the necessary copies for dissemination to the 11 highway districts in the State. Equally important was the fact that movies soon become outdated, necessitating costly redoing. Filmstrips, on the other hand, can be revised more easily by substitution of new scenes and script where required, at far less cost than movies. Also, much of the photographic work and development of script can be accomplished with division personnel in the course of their regular assignments. Due to the length of time necessary to obtain full sequence pictures, taking of motion pictures cannot be accomplished within a short prescribed period, such as is normally available.

Although the division has used filmstrips in the training program of the Right-of-Way Department, Bridge Department and Equipment Department, in the employee safety program; and in several public information presentations, by far the greatest use to date has been in the Construction Department's training program.

Filmstrips have been produced or scheduled on five general subjects within the Construction Department's scope: Concrete pavement construction; asphalt plant operations; plant-mix surfacing operations; earthwork operations; and drainage structures.

First Units Completed

The first three units in this series have been completed and are being used. The earthwork operations film strip has been completed and has just been made available for showing to highway personnel. The strip on drainage structures is now being processed into final form.

Although much of the information in these films was written and pictured for the new men, considerable information was covered in detail for the benefit of some of the more experienced personnel. Not only does the material serve as a refresher for the old hands, but it also covers new and improved methods or equipment that may be unfamiliar to personnel in some areas of the State.

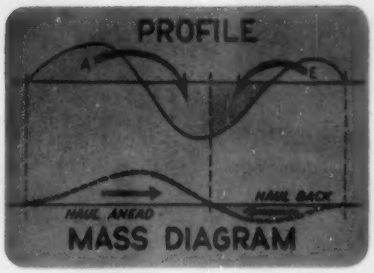
In a broad sense the five functions covered by these training aids constitute the basic training requirements of the Construction Department. In any one of the five units there are numerous operations which could easily justify a complete filmstrip production by itself. Initially, at least, a broad coverage of the five functions serves the widest need.

As an example of the scope of these filmstrips, the major subjects covered by earthwork operations are: Purpose, grading diary, working tools, right-of-way staking, clearing staking, centerline staking, slope staking , clearing and grubbing (heavy, medium and light), disposal of debris, cooperation with Forest Service, heavy grading, typical equipment, general soil types, materials report, mass diagram, excavation and slopes, stripping, selected material, benches, underdrains, all excavation, blasting, rough grading, traffic through the work, embankment preparation, recompacting, cross-drainage, drainage structures, concrete boxes, compaction, watering, subsidence, borrow pits, stabilization and erosion control.

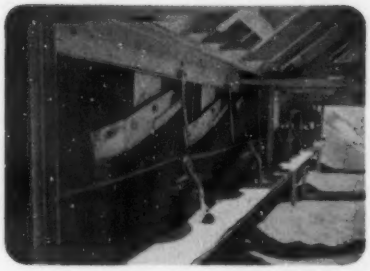
Many technical reproduction problems had to be met and solved in the production of the filmstrips. The varying exposures and field conditions under which the pictures were taken required black and white "masking" of the original colored slides to obtain a master and prints within tolerable density limitations. Although the major portion of the photography was performed for some of the filmstrips by the regular photographic staff of the division, much of the 35 mm. color photography was done by other Headquarters Staff or district personnel. Reproduction of illustrative charts, diagrams and drawings is now accomplished by a direct process in the Headquarters Photographic Section, and is then as-

(*Continued on page* 140)

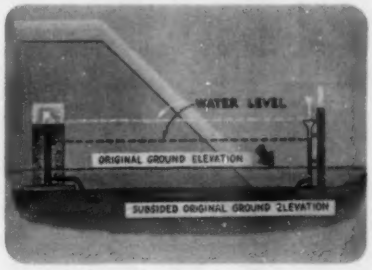
Title shot for "Asphalt Plant Operation." This is one of five filmstrips that have been produced or scheduled. The views below show shots related to the operation of asphalt plants.



Five views are shown in this column from "Earthwork Operations." This view shows the use of profiles and mass diagrams in estimating and balancing cut and fill operations.



To keep hot bins in the plant constantly filled, the operator must regulate cold flow to provide enough, but not too much, of each size. It may take some juggling for the beginner.



Settlement platform operates like a water level gage. Water is poured into tube at right until it levels off. Then the rate and amount of settlement can be checked later.

Pyrometer accurately can be checked by hand thermometer placed in shovel of hot aggregate and comparing temperatures. The two ought to check within about 10 to 15 degrees.

Construction equipment can't be operated on soft ground. It is necessary to place a layer of material over a swamp area that is enough to support the equipment to be used.

If the right sizes are not coming out but cold feed and bin operation are OK, then the timing cycle should be checked to see that each bin is getting and putting out right amount.

Cut slopes along roadsides are designed to have angles which depend on the stability of the natural soil at that location, and on the economy of construction and maintenance.

Testing sand: After settling for 20 minutes reading of top of sand is made, followed by reading of top of clay. Sand equivalent is computed from the relationship between the two.

Soil stabilization to prevent erosion is accomplished here by use of wooden grids. This method is justified where erosion might cause a serious maintenance problem in city traffic.

EXAMPLES OF FILMSTRIP PHOTOS & NARRATION

Operating the HIGHWAY DEPARTMENT of a Rapidly Growing County

NELSON W. HALL,

Rockland County Supt. of Highways

New City, New York

NEW BUSINESS, some of it large and nationally known; housing developments; and individual home building have caused the population of Rockland County to rise 20 percent — from 89,000 in 1950 to 107,000 in 1956; and it is expected to reach at least 170,000 by 1975. Highway use has increased a good 25 percent in the last five years. The New York State Thruway and the Palisades Interstate Parkway are expected to accelerate the rate of influx tremendously. The county is rapidly becoming suburban in many, and truly urban in some, regions.

To keep up with this growth, the Rockland County Highway Department has had to expand too. As late as 1945, the department had an office in the basement of the Court House in New City, a 24 x 36-ft. shed nearby and a small rented garage building in Stony Point. These facilities easily housed the few old trucks and the 15 to 20 men which then constituted its resources. The Department is no longer working on a shoestring. Its facilities and manpower have grown to meet present day needs and its planning is geared to the future.

Highway Buildings

Foreseeing the growth of the County and the important part that the Highway Department would play, the Board of Supervisors, as a first major step in a highway department expansion program, authorized the County Superintendent to construct a highway building to house his operating and engineering forces. This building, erected in 1946 on a 3-acre lot west of the Court House in New City, has under one roof a 50 x 50-ft. wing on the street side for office and engineering use; an 80 x 150-ft. structure for equipment storage in the center; and a 50 x 60-ft. repair shop at the rear. There is a full basement under the office space for storage of supplies. The office wing is finished in brick while the rest is of cinder block which has been stuccoed and painted. On the street side the grounds are planted with lawns and shrubs.

Due to the distance from main headquarters in New City, a subsidiary garage has always been needed to provide for efficient operations in the northern end of the County. The rented space becoming inadequate, a 6-acre site in Stony Point was purchased and developed in 1950-51 which included a 36 x 83-ft. prefabricated steel building for storage of equipment; a 16 x 40-ft. prefabricated building for office, ready room and tool locker; and a 10 x 18-ft. frame structure for

● **DRAINAGE is a big problem in areas of rapid population growth. The trick is to plan ahead because growth is often almost imperceptible, but steadily increases.**

● **HEADQUARTERS Office, showing office wing, main equipment garage and a portion of one prefabricated steel building. County Court House is in background.**

storage of bagged ice control salt.

The "new" big building in New City also became overcrowded within a few years and in the spring of 1955 a 28 x 90-ft. prefabricated steel building with floor at truck body level was erected to house supplies and materials. This was followed early in 1956 by a similar building, 28 x 100-ft., with floor at ground level, in which is to be kept equipment which is used seasonally or occasionally. A paint and sign shop and a shed for bulk storage of salt are planned for 1957.

It is worth noting that, in the building program undertaken by the Highway Department, except for technical trades such as plumbing, heating and electrical, almost all of the work has been done by the Department's own men. This has had the double effect of economy in construction costs and of helping to keep the permanent forces usefully occupied the year round. When erecting the buildings the men were paid prevailing rates as set up by the State Labor Department.

Our Equipment

During the last ten years the quantity and quality of County owned equipment has vastly improved. The Department now has: Station wagons; trucks (2-wheel drive); graders; shovels, backhoes and cranes; mowers; trailers; pumps; chain saws; pickup trucks; 4-wheel drive trucks; rollers; bulldozers; sweeper; spreaders; compressors; and generators.

It has also modern machine shop and garage equipment as well as a good inventory of tools, parts and supplies. The latest addition has been a light and a wheel alignment tester which was necessary to qualify as a New York State official inspection station. The Department's aim is to own and operate all equipment needed to do any highway work, with the exception of a few specialized items such as bituminous concrete spreaders and oil distributors where the amount of use would not justify the investment.

The old procedure of keeping equipment going, held together with string and baling wire, till it "died with its boots on," has been scrapped. It is now standard policy to replace equipment as soon as rising maintenance costs, falling trade-in values and efficiency make it economically advisable. On some machines this point depends to a great extent on the amount of service the machine has seen; on others, especially trucks and cars, it has been possible to establish a definite replacement cycle.

Manpower Changes

Not too many winters ago, it was a familiar sight to see two or three men shoveling sand from the back of a slowly moving truck onto a slippery road. In summer a truck-driving foreman would be seen directing a few old laborers scratching in a ditch. Such methods are too slow and inefficient today. Although a certain amount of hand work is still necessary, the Department has become highly mechanized and the forces are now geared to this idea in quality as well as quantity.

The permanent, year-round number of employees has more than doubled since 1945 and this is increased about 50 percent in the summer by high school and college boys who do much of the unskilled work still needed. On the regular payroll there are now few old timers in the laborer classification. Most new employees are younger men who start as laborers with the incentive that they may soon be able to qualify for and be promoted to motor equipment operator.

Perhaps the greatest change in the manpower line has been in the engineering and office forces. Once a junior engineer and a senior stenographer took care of all office work. Today an assistant engineer has three full time men under him and an office manager has two senior stenographers for his work; there is also an inspector whose duty it is to supervise the work of road openings and street and driveway connections by municipal, utility or private interests under a recently installed permit system. These forces are being pushed to the limit and consideration is being given to the addition of a timekeeper and another man on the engineering staff.

● **READY for winter. Part of the County plowing equipment ready for use. State, County and Town together have one piece of equipment for each 9 miles of roadway.**

● **TYPICAL of present highway standards in Rockland County is this road in the Town of Haverstraw. The Hudson River is visible in the background.**

In the white-collar branches, as well as in the field, it is now the policy to provide the best and most complete equipment possible to insure efficiency and speed. Office equipment includes electric typewriters, calculators, adding machines, photo-copy and blueprint machines. Dictating machines for the office are included in the 1957 budget. Additional office space is being worked out to improve our operating efficiency.

Pavement Operations

A great many of the County roads were originally the old winding wagon roads hacked out of the woods in the last couple of centuries and sometimes surfaced with gravel or stone screenings. These roads were usually not more than 14 to 16 feet wide and were paved for horseless carriages by a light penetration or surface treatment over whatever base happened to be there at the time. Maintenance consisted of giving the roads a dose of oil once in a while and the rest of the time in keeping nature from taking over again.

The first step in the improvement of these roads was to widen them till they could pass two modern trucks. This proved to be only a stopgap. Today's traffic demands sturdier construction and easier curves and grades. With this in mind roads have been and are being reconstructed as rapidly as finances permit and traffic conditions warrant. The standards now call for a thick gravel sub-base and a penetrated stone base topped with bituminous concrete; the pavement width is 24 to 30 feet with 7 to 10-foot shoulders.

In order to keep all road surfaces in good condition a regular program of maintenance has been worked out. As soon as the frost is out of the ground the roads are carefully inspected and all pot holes, cracks or settlements are patched and leveled. Following this and with the advent of really warm weather the roads are given a surface treatment according to a rotation schedule under which every road is covered every third year unless its condition calls for treatment sooner.

One of the biggest problems in the development of a rural into a suburban area is the disposal of surface drainage. This problem is especially acute where extensive subdivisions are being built. Storm water can no longer flow across lots to the nearest stream; it must be channelled through gutters, catch basins and storm sewers. In the case of a housing development drainage needs can be foreseen and allowed for in the subdivision plans, but where the building is done by individuals over a period of years the problem is one of imperceptible increase not attributable to anyone in particular and the necessary facilities have to be supplied by the Highway Department. In either case the responsibility of seeing that storm water is properly handled lies almost entirely with the Department. It is also necessary to watch the construction of new streets and driveways in order to prevent the obstruction or overloading of existing drains. The building of new and the cleaning and maintenance of old ditches, catch basins and pipes is a big item in the budget.

Brush & Weed Control

Much of the hand labor that used to be needed to cut weeds and brush along the County roads has, in recent years, been eliminated by the use of chemical sprays. This work has been done by contract and has proved most satisfactory. After the initial applications, the cost per mile of this work drops sharply since a lesser amount of spraying is needed to hold down new growth than to get rid of an original heavy growth. This chemical elimination of brush also makes for easier mowing of grass along the right of way and less dulling and breaking cutter blades.

An allied branch of this work is the removal of dead or dangerous trees and limbs on or near the roads. While the leaves are still on the trees in the early fall, a survey is made. Trees which should be removed are marked with a patch of turkey red cloth nailed on and a note of their location listed by mileage from a convenient starting point. These lists are then given to the foreman and the trees are cut down or trimmed as opportunity offers, usually between snow storms in the winter.

Bridge Operations

Early each summer, as soon as the the water is low enough, every bridge is carefully inspected and a written report on each shows its condition and what needs to be done. This system insures that the necessity for any major reconstruction, except damage from hurricanes and floods, can be anticipated well in advance and can often be tied in with the projected widening or reconstructing of that particular road. It also insures that no necessary routine maintenance is overlooked. Routine maintenance is done after the oiling season by a carefully selected crew under an experienced and resourceful foreman.

● **COUNTY Highway Department garage at Stony Point showing prefabricated steel buildings. Salt storage building is off right of picture beyond edge of sand pile.**

Sign Operations

Hand in hand with the increase in population in the County has grown the need for warning, directional and other signs and safety measures. Hardly a week goes by that additional signs are not erected to mark new intersections, schools, restricted areas and other traffic hazards. Not only the number of signs but their diversity is now such that the Department has decided that it would be advantageous to have its own sign shop. This is to be established next year.

Another thing that the Department has done for the safety of the traveling public has been to extend the use of traffic lines. Today all County roads are marked throughout with solid or dashed lines of white paint. These lines are now

all reflectorized too, a feature which was adopted after intensive investigation.

Snow & Ice Control

The quality of snow and ice control in Rockland County is a source of pride to those involved. The highly satisfactory results achieved in this work are attributable to the excellence of cooperation among the Town Superintendents, the County Superintendent and the State's Resident Engineer and to their guiding principle that "bare roads are safe roads." The County is under contract to do some of the work on State highways and subcontracts a part of this to the Towns. County and Towns also have all their own roads to care for. The ability to keep all roads clear and safe for the extensive commuting public in the County is due to the careful planning by State, County and Town highway departments.

In snow and ice control work the County has steadily increased the quantity of salt consumption. There is no waiting for snow to accumulate. With the first flakes the departments swing into action day or night. First the roads are salted; this helps to keep the snow from packing and binding tight to the pavement and, if the fall is light, may be almost all the attention needed. With a heavy fall, plowing starts on the heels of the salting and continues throughout the storm and until the roads have been cleared to full width. Then the roads are again salted and sanded until bare.

On the theory that "a man can't do nothing if a man ain't got nothing to do nothing with," all departments stress the need of adequate equipment for snow work. The Towns, County and State among them have a piece of equipment for sanding, salting and plowing every nine miles of road. In addition there are extra trucks, graders, loaders, etc., which can be mobilized as needed. With the Town, County and State garages strategically located, the equipment does not have far to travel to reach its scene of operations. Then, too, the departments stockpile large quantities of salt and sand in summer so there is little danger of running short in an emergency.

Major Projects

New construction of any size and reconstruction jobs too large to be included in the routine maintenance budget are listed as projects and are provided for by specific appropriations. With rare exceptions due to emergencies, such projects fit into the long range program of improvement to County roads and are the result of exhaustive engineering and traffic studies. Quite often these projects are undertaken in conjunction with Federal, State, Municipal or private programs; if so, the jobs are usually done by outside forces, a share of the cost being borne by the County. In many cases, however, the work is entirely a County matter in which case the amount of work proposed is scheduled, so far as possible, to be done by Highway Department forces. These jobs can be completed more economically in this way and they also help to provide a reservoir of useful work to keep the permanent men fully occupied on a year-round basis.

Planning

The growth of the operating personnel and equipment has been pretty closely proportioned to the increase in the work to be done as modified by the degree of mechanization achieved. The greater growth of the office and engineering staffs has been necessitated not only for the same reason but also because of the imperative demand for future planning and the need for adequate records and statistics on which to base this planning.

Answering the telephone, making out a payroll and checking a few bills is no longer the principal work of the clerical force. These things still have to be done and in a vastly more complicated way. And many are the added reports and other information required by State and County offices. Beyond this work, which alone would double the size of the job, is the duty of recording all activities of the department so that up to date facts are always available for the guidance of the County Superintendent and his engineers and of helping them in many ways with planning for future operations.

The engineers also can no longer work on a day to day basis. Their thinking has to be very largely in the future. Whenever they are faced with the problem of planning a road or bridge they must first ask "how does this fit into the overall County picture?" This policy of long range planning has developed rapidly since World War II and was given a great boost when the Board of Supervisors established the Rockland County Planning Board in 1953.

Working in close cooperation with the Planning Board has proved to be of great mutual benefit, the studies of one body complementing those of the other. Frequent consultations with the Board of Supervisors have helped to pinpoint the direction and extent to which more detailed study should be applied. The short-comings of piecemeal planning is rapidly being overcome by studies now well underway or ready to be started. These include on a County-wide scale surface drainage, sanitary sewers, recreational facilities and a complete study of highway conditions with the use of traffic counts and destination studies. Population and building trends have been studied and are taken into account in all planning.

It is true throughout, but it becomes most evident in the matter of planning, that a County highway department is not a self-sufficient entity. It is an integral part of the community and must dovetail its operations and planning with those of others. To accomplish the greatest good, therefore, the department must cooperate wholeheartedly with all—the Towns, the State, the other County offices and the Board of Supervisors.

● **BARE ROADS are safe roads: Salting starts with the storm; plowing follows.**

A UNIQUE Public Works Project:

A FOOD CENTER

to provide Better Distribution

CHARLES L. CRANGLE,*

Executive Assistant,

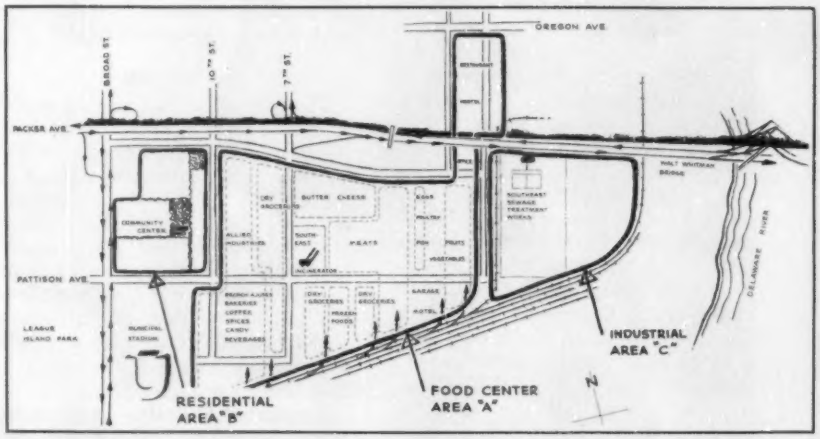
Philadelphia City Planning Commission

MAJOR PUBLIC works projects are not new to Philadelphia, but none is more grandiose in scale than the $100 million food distribution center approved last year by City Council for South Philadelphia. Construction is to be financed primarily by private capital through the issuance of mortgages and bonds. These financial operations may cover a period of 40-50 years. The venture is a pioneering one, and it is hoped that it will be a model for other American cities in replanning food terminals to meet modern requirements of food wholesaling and distribution.

The proposal was first advanced by the Greater Philadelphia Movement (locally the GPM) in 1954. This is a private non-profit organization of business men whose influence has been strongly felt in many local and regional projects, from civic reform to industrial development. The City Planning Commission, well aware of the food distribution problem, gave immediate and firm support.

When GPM took up the problem, its first step was to have a survey of possible sites and other factors prepared. The U. S. Agriculture Department was persuaded to lend the services of William C. Crow, Chief of its Transportation and Facilities Division and an expert on food centers. Pennsylvania State University also assisted on the project, and the completed study, which recommended a single integrated center to service all aspects of food distribution, was announced in October, 1954, at a dinner attended by the chief officials of some 42 national food companies. The proposal was presented as a package job, complete with a model of the finished center.

*Mr. Crangle is leaving Philadelphia the end of January to take over as Planning Director for the New Hampshire State Planning and Development Commission.



● **PATTISON Avenue East Redevelopment where a blighted area will be replaced by much needed facilities, primarily for food distribution, based on modern planning.**

The City Planning Commission, a month later, certified the area within which the food center was to lie as a redevelopment area, and started work on a plan—a necessary first step before the Redevelopment Authority could acquire the land desired and make it available for the proposed development.

While the redevelopment plan was still in process, GPM announced the organization of a non-profit corporation to develop the center. To guide the development of the project 25 civic leaders agreed to serve as an unpaid board of directors.

There was no question of the need for the new center. Philadelphia's Dock Street Market is approaching its 200th birthday. Barely able to serve the trading needs of a horse-and-carriage age, Dock Street and the streets around it reduce modern traffic to a hopeless tangle, while the antiquated buildings do not provide dealers with the space or facilities they need. Other food wholesaling locations in the City are widely separated, and travel between them frustrates even the boldest retailer.

The proposal received firm support from the U. S. Department of Agriculture which has pointed out that food waste and useless rehandling, because of obsolete facilities, increase the cost of food by millions of dollars a year. In the initial studies, the USDA covered all aspects of the problem including data on total car lot unloads of foodstuffs at wholesale in Philadelphia by months; the estimate of salaries and wages for operation; the number of facilities required; and the size of the units.

The plan proposed by GPM was a simple one. Present wholesale food centers were cramped for space. But in South Philadelphia there was an area of nearly 700 acres, most of which was low-lying vacant land used primarily for refuse disposal.

It adjoined existing railroad trackage, was conveniently close to existing piers and docks along the Delaware River and paralleled the approaches to the new Walt Whitman Bridge connecting South Philadelphia with New Jersey and the new Jersey Turnpike. Not far away was the airport and the Industrial Highway, linking the site to traffic from Delaware and the south. The proposed Delaware Expressway would, in time, tie it equally conveniently with Bucks County to the north, and the major routes to New York. Few, if any, sites were comparable from the standpoint of transportation.

The area certified by the Planning Commission covers 667.89 acres, and is of irregular shape, its boundaries being generally dictated by existing barriers—the bridge approaches, the railroad trackage, and Broad Street, the City's major north-south traffic artery. Not all of this area will be required for food center purposes, and the final plan proposed three uses in the area. Area A is the Food Distribution Center itself. About 365 acres in the center of the tract are designated for this purpose. Space in the area totaling between five and six million square feet will be available for all types of food processors and wholesalers, to be housed in two types of accommodations—multi-store structures for the smaller agencies, and separate buildings for the larger firms. Each of the seven major commodity groups (fruits and vegetables, butter and cheese, poultry and eggs, sea food, meats, dry groceries, and frozen foods) have been allocated to a separate area in the Center. Each commodity group requiring rail service has been so located that spur lines can serve all buildings both north and south of Pattison Avenue.

In Area A, and immediately adjacent to the food buildings themselves, will be service facilities rarely provided at food terminals: an office building; restaurants and a truckers' hostel; branch banks; drug stores; a barber shop; truck servicing facilities; and a motel.

Another new idea is the provision of space for industries allied to food handlers, such as bakeries, coffee roasters, packagers of spices, and bottlers. It is anticipated that the number of such enterprises will grow steadily as the food center progresses.

Area B, about 70 acres, is for residential development, on the assumption that there will be a demand for new housing convenient to the facility. Separated from the center by an industrial section, the residential area will be a self-contained village, with its own shopping facilities, elementary school and playground.

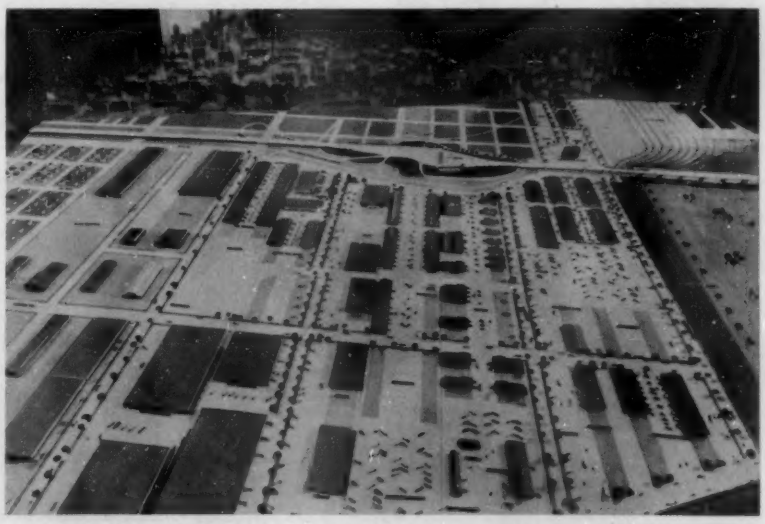
Area C is designated for industrial development. Proximity to rail lines and to Delaware Avenue and the waterfront make industrial expansion in this area logical.

Further studies, public hearings and discussions between the City's legislative and executive branches, the GPM, and the new corporation, were carried on through the fall of 1955. As finally agreed upon, the plan for development of the food distribution center calls for the City to acquire the necessary land; fill and grade it; install the necessary water and sewer facilities; open and pave streets; and turn it over to the food distribution center a section at a time, only as the particular section is ready for actual construction, leasing, or sale.

The joint responsibility of the City and private enterprise is recognized in the composition of the Food Center's Board of Directors. In addition to 25 civic leaders, nine City officials are members of the Board ex officio. These City members are the Mayor, the Managing Director (Philadelphia's own brand of City Manager), the City Representative, the President of City Council, the Finance Director, the City Solicitor,

(*Continued on page* 146)

● **TRAFFIC congestion on a "normal" day in Philadelphia's Dock St. Market area.**



● **MODEL OF proposed Food Distribution Center was used at meeting of representatives of forty-two national food companies to illustrate design for new food center.**

SOIL CEMENT STABILIZATION

J. J. STOBAUGH, JR.,

Construction Engineer,

Oklahoma State Highway Commission

ONE SOIL-CEMENT stabilization project was constructed by the Oklahoma State Highway Department during 1955. This project consisted of 6.685 miles of soil-cement base 33 feet wide and 6 inches thick with a 22-foot wide double asphalt surface course. The two 5-foot shoulders were surfaced with a single asphalt surface treatment. This Federal-aid Secondary Project is located in Okmulgee County.

Soil surveys made upon this project previous to the grading contract revealed that the usual soil type of the top 14 inches was A-4-(8) with an average P. I. of 5. Beneath this 14-inch layer was about 36 inches of A-7-6-(20) with a P. I. in excess of 30. Upon the completion of the grading, about 75 percent of the graded surface could be classed as a material with a low clay content. No sub-base was planned because the general soil condition was considered above the average.

The suitable soil for cement-stabilization was placed full crown width, 6 ins. thick. This was hauled from a shallow top soil pit near the south end of the project. The contractor had an item for reshaping the roadbed just previous to the placing of the suitable soil. In certain areas that might become slick due to spring rains, a layer of 2 inches of suitable soil was placed and maintained so that the required shape would be retained. This material was very uniform and was an A-2-(0). The dry density weight was 113 pounds per cubic foot, and the optimum moisture 12.5 percent. Test of this subbase material showed the following averages: Liquid Limit of 23; P. I. of 2; 100 percent passing Number 10; 99 percent passing number 40; and 30 percent passing the number 200. The clay and silt content was 23 percent. Cement used for stabilization averaged slightly over 7 percent.

● **TO INSURE proper quality, specimens are tested to determine compressive strength and moisture content.**

The cost breakdown for the six classes of work involved with the construction follows: Re-shaping roadbed, 3 percent; suitable soil for stabilization, 17 percent; manipulation and laying, 25 percent; cement for stabilization, 33 percent; curing the base with RC-2 asphalt, 1 percent; and double asphalt surface and shoulders, 21 percent.

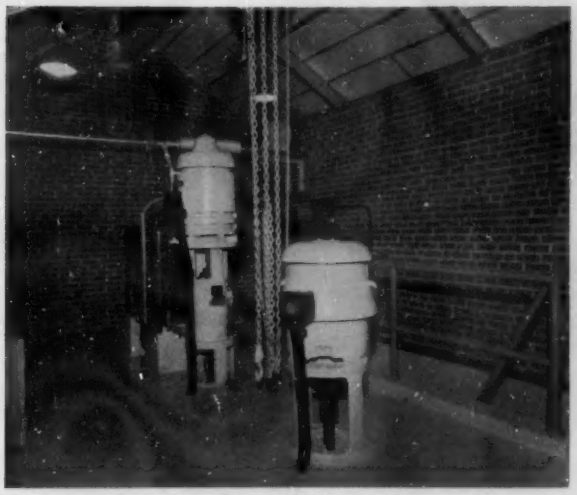
The cost for this 33-foot wide soil-cement base and surfacing was $20,700 per mile. Hauling the suitable soil required about 25 days and when 80 percent of this soil was hauled the manipulation and laying work started which required 19 working days. The curing time plus the placing of the surface course required 10 days.

The equipment used on the project was as follows: An auger type cement loader for bulk cement; Koehring cement spreader; dump trucks; a set of 20,000-pound scales; a "P and H" single pass stabilizer; a large drum sheepsfoot roller with tractor; motor-grader; Ferguson farm tractor with spring tooth and spike tooth harrows; pneumatic roller with tractor; water truck with pressure type spray bar; and Etnyre asphalt distributor.

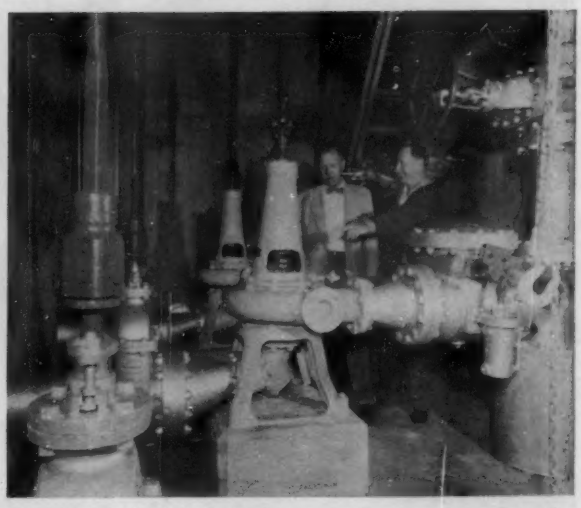
F. L. Barrett was the Resident Engineer, Leo C. Brooks, the Division Engineer and Jno. J. Stobaugh, Jr., the Chief Construction Engineer for the Oklahoma State Highway Department. Tom Ward was the Superintendent for the Park-Ward Construction Company, the contractor.

● **TO START compaction properly from the top of the pavement down, a pneumatic roller should follow initial blading.**

● **AFTER rolling the base to the specified depth and density, a bituminous cover mat is placed to assure positive curing.**



● SEWAGE overflow is prevented at Stella Maris pumping station by standby engine connected by right angle drive.



● TWO OF the 5-inch bladeless impeller pumps used at the Stella Maris station; Mr. Welsh and Mr. Hauptman are shown.

Dependable PUMPS and MOTORS *in an Expanding Sewerage System*

GEORGE W. WELSH, JR.

Deputy Chief,

Bureau of Operations,

Baltimore County, Maryland

THE RAPID development within the past ten years of suburban areas surrounding most major cities in the United States has resulted in an ever-increasing sanitation problem. Sudden concentration of population in limited geographical areas can often outstrip sewage collection and treatment facilities, presenting a threat to the health of an entire community.

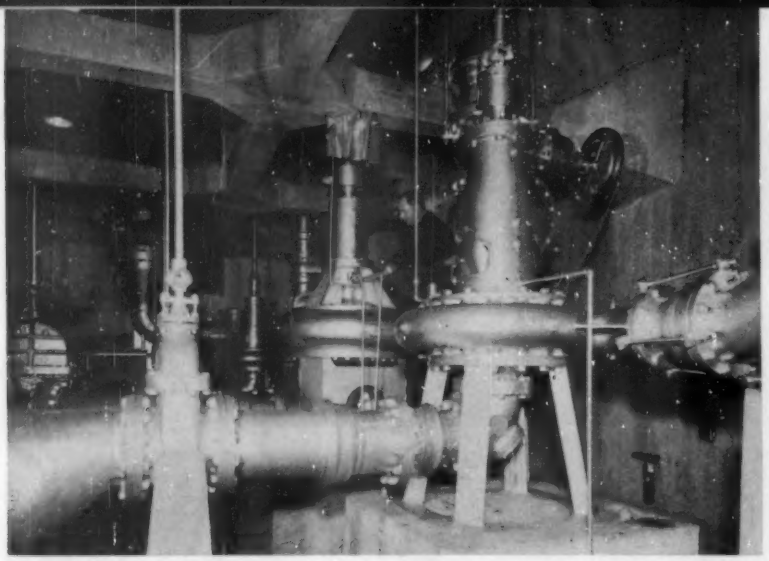
Officials of Baltimore County, Maryland, the suburban area around the city of Baltimore, anticipated this situation at the end of the war and in conjunction with the State Planning Commission conducted an extensive study of national and regional growth patterns and population movement pertinent to the Baltimore area. It was discovered that the county added between 16 and 25 thousand citizens each year, and that the 1945 population of 190,000 would reach 370,000 in 1955, exceed half a million by 1965 and increase to 700,000 in 1975. On the basis of these studies, county officials drew up a plan of construction and expansion which would provide adequate sewage disposal facilities during the period of growth and would be extensive enough to serve the maximum predicted 1975 population. The county sewerage system collects and delivers most of the sewage to Baltimore city mains. Only about five percent of all sewage collected in Baltimore County is processed in the two small county treatment plants. The county pays a yearly fee to the city of Baltimore for treatment of the remaining 95 percent of its sewage, the exact amount based on the county's percentage of the total processed in the city plants. Where it has been necessary for the city to construct new mains or enlarge facilities to handle the additional flow of sewage from the expanding Metropolitan District, the cost has been borne by the county.

● SYSTEM includes 53 pumping stations. This is a typical small station.

$5 Million Annual Expenditure

Since construction was begun in 1948, the annual expenditure for county sewerage facilities exceeded $5,000,000. As late as 1937 there were only four sewage pumping stations in the county. Today 51 stations with 91 pumps are in operation in the system. An additional 13 stations are in various stages of planning or construction. The variety of pump sizes and types, ranging from 2 to 12 inches, matches the variety of special requirements at each station. The motors driving these pumps vary from 5 to 125 hp., depending on pump size and the extensive range in total dynamic head.

Of 61 Fairbanks-Morse pumps in the system at the present time, 50 are either 4 or 5-inch units. These pumps pass a 3 to 3½-inch solid with discharge capacities from 750 to 1000 gpm, depending on tdh and speed. For easy maintenance, and because many of the stations are situated along tidewater rivers, almost all pumps in the system are of the vertical type with the motors placed high above flood levels. In some stations, to alleviate flood problems, the suction line between pump and suction valve has been



● **DRY WELL at the Patapsco Station. Mr. Hauptman is checking the 7500-GPM pump, largest in the system, which operates against a total dynamic head of 46 ft.**

tapped with a 1½-in. line extending to a sump, with a valve in the line. Both suction valve stem and the tap line valve stem extend up to the motor floor. If flooding occurs, the suction valve is closed, the small valve opened and the sewage pump removes flood water from the pump room.

The Patapsco Station is the largest in the system at the present time, with a discharge capacity of 11,500 gpm. Raw sewage from eight smaller stations covering the entire south-western sector of the county enters the Patapsco Station through a 48-in. concrete influent line. The sewage is pumped through a 30-in. force main, a distance of 8711 feet, across the Patapsco River into a city interceptor.

In the station are three Fairbanks-Morse vertical sewage pumps driven by F-M motors. Two pumps are 8-in., each with a discharge capacity of 2000 gpm at 25-ft. tdh. These pumps are driven through shafts from above by two 50-hp. F-M vertical hollow shaft motors at 490 rpm. The larger third pump is 12-in. driven by a 125-hp. motor operating at 503 rpm. This pump has a discharge capacity of 7,500 gpm at a total dynamic head of 46 feet.

The Green Ridge Station, another important installation, is situated in the watershed area of the water supply system of the city of Baltimore and no sewage overflow can be permitted. To protect against this, an automatically-controlled gasoline engine is connected by a right angle gear to the drive shaft of one pump to operate in the event of electric power failure. In addition, the station has a high water level alarm connected with the Central Yard office by leased telephone lines so that a man from the pumping division can go to the station immediately if any trouble develops. Two influent lines lead to the station, one a 14-in. force main and the other an 8-in. gravity line. A section of 42-in. gravity line leading into the wet well provides additional storage capacity, further decreasing the danger of overflow at the station.

Typical of many small stations in the system is the Stella Maris installation which feeds into the Green Ridge station. Two influent lines of 12 and 15 inches carry sewage into this station, and it is discharged through a 14-in. force main to Green Ridge, 5467 feet distant. The station has two 5-in. F-M bladeless impeller sewage pumps in the dry well with combined discharge capacity of 1400 gpm at 110-ft. tdh. Stella Maris is another watershed station and consequently has a standby gasoline engine ready to drive one of the pumps if electric power should fail.

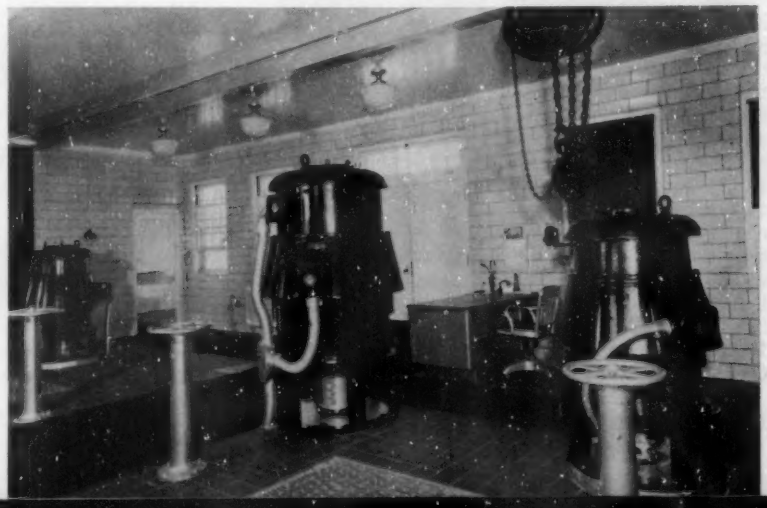
The largest of thirteen new stations either under construction or with contracts awarded is Battle Grove in the south-western sector of the county. In this station three F-M 6-in. vertical sewage pumps will have a combined discharge capacity of 5485 gpm through 1463 feet of 16-in. cast iron force main emptying into a gravity line. Two of the pumps will operate with total dynamic heads of 23.5 feet, and the third will have a 26-ft. tdh. In Battle Grove, as in the other stations under construction, a color code has been applied to all equipment and piping to simplify tracing of the various systems. Presently being applied throughout the county system, this code will facilitate maintenance and speed emergency repairs.

Equipment is Catalogued

The author has compiled a catalogue of all stations, listing them alphabetically with a brief resume of station operation, a key sheet showing location of the station, serial and model numbers of each piece of equipment and photographs of each station. This volume has been helpful as a ready source of information on the stations and for ordering of replacement parts required. It is also beneficial when a new interceptor sewer is installed and a station is dismantled, since the list of equipment may be readily checked to ascertain whether any may be used in other installations.

Each station in the system is visited at least once a day to check pump operations, bearings, grease, etc., or to make necessary repairs. Attendants travel in pairs as a safety precaution, maintaining the grounds during the summer months and touching up the painting in the winter months. To insure daily visits, recording meters at each station are arranged for daily charts which must be changed and filed by the maintenance men every 24 hours.

● **MOTOR room in the Patapsco Station, showing motors of three vertical pumps.**



● **DISPLAY set up by Borough in shop window to inform the public on ice control procedures using salt and Banox.**

A "Near-Miracle" in
ICE CONTROL

WALTER H. NIEHOFF,

Borough Manager,

Lehighton, Pennsylvania

BANOX caused a near-miracle in Lehighton last year. North street runs along the two blocks of our city park, located in the center of the borough. It carries one-way traffic from our main street west. The second block is a very steep hill which, prior to making it one-way in the spring of 1955, was never used at all during the winter because ice and snow made it impassable. Now, being a part of the main highway system, it had to be kept open and clear at all times.

When I became Manager in September, 1955, I found a great deal of public interest in what would be done to keep this hill passable. In fact, local papers and the general public had already dubbed it "Winch Hill" in anticipation of the trouble which nearly everyone expected.

In prior years cinders were used exclusively. We had the usual trouble—dirt and expense; and we knew that cinders would not help us on this steep hill.

My Public Works Superintendent and I realized that rock salt was the answer; but, both being natives of the community, we also knew of the deep-seated local prejudice against salt. Banox gave us the answer, not only because of its anti-corrosive action, but specially because it provided a good psychological weapon whereby we could focus public attention on our efforts.

As the season for snow and ice approached, we stocked bags of rock salt with a small amount of Banox. Only the Superintendent and myself knew of the plan. Then in the early afternoon of December 9, snow began to fall; by 3:45 PM we noted it was time for action. Within fifteen minutes our truck was spreading two bags of salt by shovel on the three block area to be tested. By 4:20 the street was clear. Even the workmen were surprised and amazed.

● **"WINCH HILL," the steep grade on which the effectiveness of the newer method of ice control was demonstrated.**

Snow-Free Hill a Mystery

It was amusing to watch local cars approach "Winch Hill" and hesitate, puzzled to note the complete absence of snow on the hill, while streets running into it were already loaded with slipping cars. At 7:30 PM we counted 173 persons standing at the

● BOROUGH employees demonstrate the unsightliness of cinders and the expensive clean-up after snow is melted.

● SUP'T. OF Public Works Horn pointing out the clean street and gutters that come from using salt and Banox.

corner and asking what had been done. We fed the mystery by ignoring the questions.

The next morning the "Allentown Morning Call" carried a story stating that driving conditions were impossible in every community in Lehigh, Northampton, and Carbon counties. It closed with the following: "But while other towns were cindering and plowing the snow, Lehighton came up with a plan for clearing streets at 39 cents a block. North street, from First to Third, was wet from three inches of snow, but hadn't so much as an ounce of snow on it. Lehighton officials applied a mixture of rock salt and a product called Banox shortly after the snow began. Borough Manager Walter H. Niehoff said it cost 78 cents to clear the two blocks, normally one of the worst winter stretches in the Borough."

Of course, the newspaper was off about a dollar in the cost, but it was still much cheaper, and certainly more effective, than cinders.

The reaction locally was tremendous. At 11:00 PM, the night of the snow, our Street Chairman received a phone call from a taxpayer asking what had been done to clear the hill. Naturally he didn't know. He visited the site and couldn't believe that this was actually the only clear street in the community.

At the next Council meeting I suggested extending our experimental use of salt-Banox to all intersections, and received authority to purchase a Tarco Scotchman salt spreader at once. The intersection experiment was a great success, and by mid-winter we were salting nearly all our streets. But since the main business street is under our state highway department, we had to endure the dirt from the cinders which that department spread there. I contacted the highway Superintendent and requested that he allow us to salt all highway streets. Needless to say, he was delighted.

The reaction of our businessmen was instantaneous and satisfying, since the use of salt eliminated the injurious effect of cinder dust on merchandise in their shop windows.

I am telling this story at some length because I feel that Banox has been a blessing to us. This year we have purchased a carload of salt and an appropriate amount of Banox. Banox was just what we needed to permit us to do an effective winter job, and it certainly gave a great lift to our public relations efforts.

We plan to set up a window display in our most prominent shop window depicting the measures our borough takes to provide clear streets during the winter and to show the public how Banox protects them in order to retain public support for our program.

The Problem of Insect Resistance to Chemicals

Resistance of insects to insecticides has been reported as early as the 19th Century, but it was not a problem of magnitude until the chlorinated hydrocarbons became widely used. DDT, because of its universal application, became the first casualty of the resistance phenomenon, when flies failed to succumb in control measures in Sweden in 1946. Replacement of DDT as an insecticide by other chlorinated hydrocarbons was short-lived because of rapid resistance development. Other insects of medical importance seemed to be similarly affected. Furthermore, evidence is available that cross resistance between toxicants belonging to chemically unrelated groups is possible. At present there is hope that the new phosphorus insecticides (diazinon, chlorthion and malathion) will provide at least part of the answer to the resistance problem. The mechanisms of resistance appear to fall into three categories: (1) Reduced pentration into the insect during short-time exposure to the toxicant, (2) Detoxification mechanisms, and (3) Storage. Study of the detoxification mechanisms has shown that DDT-resistant houseflies are able to degrade DDT to its non-toxic metabolite, DDE. Repeated attempts to reactivate the toxic value of DDT by the addition of synergists have been without success to date. The question of resistance of anophelines has focused attention on the change of behaviouristic patterns of insects. It has been found, for example that a nocturnal migration from houses to nearby vegetation protected houseflies from picking up lethal doses of the insecticide. Behaviouristic resistance may be an even greater problem than physiological resistance. In view of the importance of insecticides in control of insect enemies, the problem of resistance has to be solved. —Abstracted from "Some Remarks on the Problem of Insect Resistance to Insecticides," by K. R. S. Ascher, Israel Defense Forces, *Tavruah,* April, 1956.

● FROM-THE-AIR view of the West Park pool, showing shallow area in foreground and deep pool in the rear.

UNUSUAL DESIGN
Cuts Swimming Pool Costs

PHIL HIRSCH

TWIN SWIMMING pools built last year in Park Ridge, Ill., near Chicago, contain several unique features that are expected to cut operating and maintenance costs considerably. The tanks are built of welded steel plates, and they utilize "closed circuit" water distribution systems. As a result, maintenance and water consumption costs should be appreciably lower than for a similar-sized pool that the community has been using the past 27 years, according to Park Ridge Park District officials.

The new pools were built in West Park, an 18-acre recreational development that should be fully completed in 1957. Total cost will be $430,000 to $450,000—$60,000 for the land, the rest for facilities. Funds were obtained through bond issues. Approximately $160,000 is invested in the two pools, purification and pumping facilities, adjacent sundecks, fencing, lighting, drainage facilities and pool equipment. McFadzean, Everly and Associates, Winnetka, Ill., designed and engineered the project.

One of the two new swimming pools has a maximum depth of 4 ft. 6 in. It is designed for family aquatic activities, and for swimming instruction. The other pool, immediately alongside, has a maximum depth of 11 ft., and includes diving boards at the deep end. Both pools have the same minimum depth—3 ft. 6 in.—and the same overall dimensions—50 x 82 ft. 6 in.

The steel plates forming each tank are ¼ in. thick and measure approximately 4 x 20 ft. The tanks rest on a 1-in. layer of sand over a 5-in. layer of theoretically-graded crushed stone compacted to 95 percent maximum density. Under the welded joints in the floor are channels made from 3-in., 4.1-lb. steel. The weldment extends into these channels to keep them in place. Main function of the channels is to dissipate the heat of the welding operation, and secondarily to increase the strength of the joint. Without channels, the asphaltic paint coating the underside of the tank would be burned off in spots, and this would increase the chances of corrosion from underground moisture.

A channel bar runs horizontally along the back of the plates forming the sides of each tank. At intervals, this channel is welded to vertical and angular buttresses. The plates, vertical and angular buttresses are all anchored to concrete footings. To prevent underground hydrostatic pressure from bending or buckling the plates, especially during construction, relief plugs are embedded in the floor plates. The 3-in. dia. plugs are capped with brass fittings when the pool is filled and can be reopened later as necessary.

● POOLS are made of steel plates; 3-inch channels are placed under each weld; tanks rest on a 1-inch layer of sand over a graded and compacted layer of stone.

The water recirculation system is designed to reduce cleaning costs and to provide thorough circulation within the pool. Fresh water enters the shallow pool through a grated floor trench at the deep end. A 6-in. recirculation supply line empties into this trench. The grates are designed so that water will be distributed evenly into the pool proper.

Since water is constantly moving into the pool and out again, most of the settleable matter that would normally collect at the bottom is carried to the surface. The circulation pattern is arranged so that this floats to a trough running around the perimeter of the tank 2 in. inside of the lip. At the shallow end, the trough is ⅜ in. lower than it is on the sides and at the deep end. As a result, floating material gravitates to the shallow end where it is concentrated at an outlet grate and can be removed easily by pool personnel.

The deep pool has a slightly different supply arrangement; but the circulation pattern is identical. The inlet trench, instead of running parallel to the end wall of the tank, is installed in the center of the deep hopper and parallel to the side walls. In addition, water also comes in through four adjustable orifices in the shallow end wall approximately 1 ft. from the bottom. Major reason for this variation was to assure that the larger quantity of water in the deep pool would circulate properly.

The end of each orifice is covered by vanes. By altering the position of the vanes, the quantity of water fed into the pool can be controlled.

Under normal conditions, foreign matter that collects on the surface and bottom of the pool will travel, via the troughs, down to the outlet grate at the shallow end where it can be removed with vacuum cleaners. If desired, the flow can be reversed, so that water comes in at surface level at the shallow end and goes out through the floor trench at the deep end. Under these conditions, sediment will build up on the floor near the deep end of the pool, where it can be removed with minimum effort.

"With this system," explains Supt. Vaughan, "we have to clean only the small portion of each tank. This job takes no more than 10 minutes. To clean each tank floor entirely would require at least an hour."

The new tanks, under normal conditions, will never have to be refilled during the swimming season. Some extra water will be needed to replace that which is splashed out, or carried out by bathers, as well as losses due to evaporation; but officials are confident that the water bill at the West Park swimming pools will be nominal.

Water Savings

More important than the cost, however, is the fact that Park Ridge, like many other communities in the nation, has a limited water supply which is barely able to keep up with the community's peak summer demands. The new pool will provide recreation without making this situation any worse.

After flowing out at the shallow end of each pool, the water circulates through hair and lint screens, diatomaceous filters, water-actuated brominators, and back to the deep end. Circuits for each pool are separate. The hair and lint screen is a double unit, with the first grille acting as a protective device for the second. The former has openings measuring 2 x 2 in. while the latter is made of ¼-in. mesh steel wire and cloth. Screens can be removed easily when they become loaded. Two Bowser filter units are used for each pool; each unit has 13 elements and a filtering area of 104 sq. ft. Thus, there are 208 sq. ft. of filtering area for each pool. In the deep tank circuit, water is processed at the rate of 2.4 gals. per sq. ft. of filter area per minute, while in the shallow pool circuit, the rate is 1.59 gals. per sq. ft.

Facilities are available for connecting two 6.5-lb. bromine bottles into the water circuit supplying each pool. An Aurora vertical pump, rated at 500-gpm., is installed in the deep pool circuit, while a 332-gpm. unit of the same make is used in the shallow pool line. Both pumps are operated by 15-hp. motors.

The two pools are surrounded by approximately 21,300 sq. ft. of walkway and beach—sufficient to accommodate several hundred sunbathers. Dressing rooms are partly open-roofed, so that interior dampness can be evaporated by sunlight. Officials think there will also be less athlete's foot among bathers due to this construction feature. When it rains, enough area is under roof to provide protection for pool patrons.

Nearby is a recreational building that accommodates club meetings and similar affairs. The structure has a kitchen, meeting rooms, play room, lounge, toilets, the park office, and first aid rooms. Meals can be served to as many as 175 diners.

Additional facilities planned at West Park include: three tennis courts, three softball diamonds, a football field, ice skating rink and shelter, sled slides, playground, picnic area, horseshoe pits, and spectator bleachers around the swimming pool.

SWEEPING TAXI STRIPS AND APRONS AT IDLEWILD AIRPORT

PAN-AMERICAN World Airways uses a municipal size street sweeper on its passenger loading areas, taxi ways and hangar aprons at Idlewild Airport. It is the same model Wayne power sweeper which cleans the streets of nearby New York City. The unit collects an average of 1½ tons of dirt and debris during each eight-hour shift, covering more than 700,000 square feet of space in that time.

Prior to the purchase of a power sweeper, the maintenance and repair areas were swept by hand. The vast taxiing surfaces had to be spot-cleaned, a very time-consuming and expensive procedure. Even then, loose objects often damaged tires or were drawn up into a plane's propellers. This was explained when tools, paint brushes, nuts, bolts, and nails began to show up in the power sweeper's hopper and it was evident that another major airline problem had been solved.

● **CLEANLINESS at airports cuts dust annoyance and helps protect tires and propellers. Here a Wayne sweeper does the job for PAA at Idlewild Airport.**

Chemicals Bring a Revolution to Roadside Weed Control

WILBUR J. GARMHAUSEN

Chief Landscape Architect,

Ohio Department of Highways

● **APPLYING chemicals to roadside weeds using a 1,000-gallon tank mounted on a heavy truck. Two spray jets are in use; man on front seat directs application.**

WEBSTER DEFINES revolution as a fundamental change—one that is the basis or groundwork of a new system. Within the Ohio Department of Highways a new method, chemical mowing, has been adopted for the specific control of taller weeds because of its efficiency and economy. Thus a primary change has been adopted by the Department and a new system, chemical mowing, is replacing the old hand and mechanical types of mowing for controlling such vegetation.

As we know, fast-moving economic changes have taken place and wages are the highest the country has ever known. To keep within our budget we must do everything possible to reduce right-of-way maintenance costs while still presenting acceptable roadsides to the public. We have accomplished this by substituting a lower cost method for controlling the tall weeds, namely, chemical mowing.

Besides a saving in time and money there are other operational costs proportionately lower with reduced mowing. One division which sprayed 53 percent of rural mileage in 1955 estimated a saving of $3,000 in the maintenance and repair of their mowing equipment, plus the fact that more labor time can be spent otherwise.

The chemical mowing program, as established in Ohio, shows that our roadsides need less mechanical mowing, that hand mowing is almost entirely eliminated and that the roadsides present a neater appearance.

Chemical mowing is used in Ohio chiefly to control weeds. In most instances a grass growth inhibitor is not used because grasses planted within the right-of-way are low growing varieties, and their mature heights are not objectionable to the Maintenance Engineers.

Even the low growing varieties of weeds such as buckhorn and dandelion are minor considerations. It is the taller growing weeds, the ones that interfere with the farmer's seed crop, or with people's health or that give an unsightly appearance to the roadsides, that we must control. Heading the list of such offenders are Canada thistle, dock, wild carrot, wild hemlock, poison ivy, ragweed, chickory, horse nettle, leafy spurge, field bindweed, sheep sorrel, wild parsnip and knotweed.

Maintaining 50,000 Acres

Weeds and brush are constantly with us and we need to be on the alert to control or eliminate them as the case may be. Few people realize how many acres of land a State Highway has under its care and maintenance along the roadsides. These acres are long, narrow strips and their harvest crop is safety and enjoyment for the motorist. The State of Ohio has approximately 50,000 roadside acres on its 16,000 miles of rural state highways. These acres are a public trust and their maintenance must meet basic and rigid standards. The department demands that traffic safety and erosion control be given priority. Woody growth must be controlled in such areas as intersections and the insides of curves. There is a problem of snow fences for which shrubs or trees are valuable in some places but unwanted in others.

Chemical mowing helps accomplish these objectives efficiently and economically if applied with care and discretion. In Ohio, we feel that our herbicide weed control program effectively eliminates the varieties of weeds which produce ragged and unsightly growths. Formerly these weeds had to be

● **THIS picture shows the results of the work. The left side of the road has not been sprayed; the right side has been sprayed, with weed and brush growth controlled.**

mowed one or two times per season. Moreover, chemical control has eliminated the need of hand mowing on areas inaccessible to power mowers. It has also eliminated poison ivy from the rights-of-way. Other noxious weeds are also destroyed and their spread to adjacent land is prevented. Within this group are ragweed and other allergy producing weeds.

By this chemical control program ditches and drainage structures can be kept in a condition free of clogging brush and weeds. Spraying is an effective tool to open and maintain adequate sight distance.

Ohio's chemical weed control program was started in 1945 when we began experiments in using herbicides to eliminate poison ivy. The following year we included areas that could not be mowed with power equipment. Our conclusion at the close of this short test period was: Time loss and suffering due to ivy poisoning was greatly reduced; vegetation was more effectively controlled; and the right-of-way was cleaner and more economically maintained.

In 1951, we decided to spray all the roadsides in an entire county. In 1955, the department made its greatest effort to lower the cost of controlling the growth of weeds and brush along the rural state highway rights-of-way by herbicide weed spraying. Sixty-four counties participated in the program, and spray applications were made one or more times to 9,294 miles of roadsides of the 15,996 miles of rural mileage in these counties at a cost of $191,-314.45.

The average cost of spray treatment per mile per season has risen each year, from $16.39 in 1953, to $20.58 in 1955. This is due chiefly to more intensified effort to cover the right-of-way completely with spray and to the more widespread use of the multiple type spray program.

Of greater interest, however, is the lowering of mowing costs. In 1953, it cost $91.78 per season to mow each mile (both sides) that was sprayed, and $92.75 per mile to mow roads not sprayed. In 1954, it cost $82.61 per mile per season for mowing sprayed road against $117.89 per mile in counties not sprayed. In 1955, the average mowing costs on sprayed roads dropped still further to $69.33 per mile, against an estimated $119.00 per mile not sprayed. However, the true costs per mile should be obtained by combining the spray and mowing costs. In 1953, the combined cost was $108.17 per mile, and in 1955, $89.91 per mile.

With so wide a general acceptance of the spray operation as an aid to roadside maintenance, we must guard against over enthusiasm. This herbicidal material remains a potent and deadly force when misdirected. Application to valuable plants on the right-of-way can arouse public criticism. Large damage claims can result if the spray reaches susceptible plants in fields or gardens or in home plantings.

Will such a program meet the needs of your State Highway Departments? This will depend to what extent you develop it and your knowledge of some of the problems. Personnel may have to be trained.

The most important factors in preventing damage to adjacent vegetation and in assuring effective weed control, are adequate planning; intelligent supervision by informed and alert personnel; and thoroughly trained men to do the actual spraying. This cannot be emphasized too strongly as the success of the operation depends greatly upon these factors.

With the release of herbicides for general usage, a new front line was established in our endless war with weeds. We were ushered suddenly into an age of chemical control, with new dust and liquid killers being compounded for nearly every damaging and discomforting weed pest of mankind and his crops. Keeping close pace, of course, were developments in the equipment used to apply them. The first chemicals were the type that killed everything. Then came selective herbicides.

With the development of the new herbicides came also important new weed control chemicals in the form of 2,4-D. Now 2,4,5-T has been added as the chemical to control undesirable brush. We have in the hormone herbicides a tremendously effective and useful tool, but we must use them carefully with due regard to the rights and even the prejudices of others, or we are going to have the tool taken away from us.

Factors to Consider

When a spray program is adopted, consideration will have to be given to contract vs force account spraying. In favor of contract spraying are: lower costs, greater saving on equipment, speed of application, and damage claims handled by the contractor. For force account spraying: closer control, application to all needed parts of right-of-way, heavier applications where needed; but the criticism and complaints from organizations and individuals will have to be answered and claims for damages will have to be met.

Based on the success of herbicide control on Ohio's roadsides, it appears that a three-year program of three sprays per season be used. The first spray may be applied early in the season. The mixture should contain a minimum of three pounds acid equivalent of a polypropylene glycol butyl ether ester or a butoxyethanol ester of 2,4-D per 100 gallon of water at a minimum rate of 100 gallons per mile (2½ to 3 A.). The second application should be performed after July first, using two pounds of 2,4-D, and one pound

of 2,4,5-T. The third spray is applied before Sept. 1, using three pounds of 2, 4-D. Equipment should be prequalified 1000-gal. sprayers. After the three-year period, only one application per year need be made.

Trained crews must apply accurate amounts of material and wind, atmospheric conditions and susceptible vegetation must be considered. Prior to spraying, the areas should be investigated and slopes subject to erosion should not be sprayed; likewise, desirable vegetation not to be sprayed should be clearly marked. It is necessary that spraying and mowing operations be coordinated and a fertilizing program be included.

If and when cattle claims arise, it is necessary to work very closely with your University and with the Department of Agriculture, especially the Veterinary Division. All damage claims must be investigated with tact and understanding.

Chemical mowing like any new product, needs to be publicized so that the general public will understand and accept it. The safety economy and efficiency of the program should be stressed. It is of paramount importance that no opportunity be overlooked to promote good public relations.

● SPRAYING operations using a 500-gallon tank plus a 300-gal. auxiliary.

Sewage Treatment

for a Growing City

WALTER RUDOLPH

in cooperation with
Consoer, Townsend & Associates,
Consulting Engineers,
Chicago, Ill., and Pittsburgh, Pa.

YEARS OF PLANNING by city officials have created for Erie, Pa., a multimillion-dollar revitalized and enlarged sewage treatment plant. This construction climaxes some five years of intensified installation of sewage and storm water collection lines, including over 18 miles of vitrified clay and reinforced concrete pipe, ranging from 6 to 84 inches in diameter.

Residential, commercial and industrial growth has been accelerated in recent years by an average annual population increase of 1.2 percent. Population for Erie and adjacent municipalities and townships is now upwards of 160,000. Intercepting sewer work now being installed constitutes an enlargement of an intercepting sewer system installed in the early '30's. The new system will have sufficient capacity to carry the expected flows from a population in excess of 200,000. Reasonable provisions have been made in the interceptor design for flows from the city areas of probable development in the future, and for flows from adjacent municipalities which may use Erie's facilities.

Back in 1951 city engineers recognized the sewerage problems were getting out of hand. Also the Department of Health of Pennsylvania was concerned over the degree of pollution present in Lake Erie, bounding the city on the north. Recreational use, commercial fishing, and the fact that city water is drawn from the lake only a few miles distant from the discharge point for the sewage plant effluent, contributed to the critical pollution conditions.

It was decided to retain Consoer, Townsend & Associates, Consulting Engineers, of Chicago and Pittsburgh, and authorize them to develop a "master plan" for a modern sewer system and sewage treatment plant.

To finance the needed intercepting, reinforcing and relief sewer work, city officials sold General Obligation Bond issues. These included financing for some improvements to storm sewers, and for paving and drainage of streets.

Planning for Treatment

The Erie Sewer Authority was created in late '52 for the purpose of providing adequate sanitary sewage disposal for the city. This Authority took under its wing, primarily, the problem of improving and extending the sewage treatment plant. The consulting engineers had already completed a sewer rate study and an industrial waste survey. Based on the survey and study, Erie enacted an ordinance imposing sewer rentals. These charges are about 55 percent of water rates, and all moneys collected are put into a separate fund to pay for the sewage treatment plant improvements and for the operation and maintenance of the plant.

To cover the entire works program, the Authority issued $5,300,000 of sewer revenue bonds. Use of

● **EQUIPMENT** building at right with office wing at left. Of concrete, brick and stone this building houses sludge filters, air compressors and chlorinating units.

the money was scheduled in this fashion: General construction and major equipment, $3,778,706; electrical, $118,750; plumbing, heating, and ventilating, $60,295; engineering, inspection and supervision, $320,000; construction contingencies, $290,254; and legal administrative, financing and miscellaneous, $40,000. Provision was also made for additional sludge digestion tanks, if required, at a cost of $540,000.

Before the present changes, this was a primary type plant, with two square concrete settling basins and three circular digestion tanks of 375,000 cu. ft. capacity. It was originally designed for a flow of 20.0 mgd. However, this plant was able to give only partial satisfactory treatment to a sewage flow of 20.0 mgd, resulting from a total population of 100,000 persons.

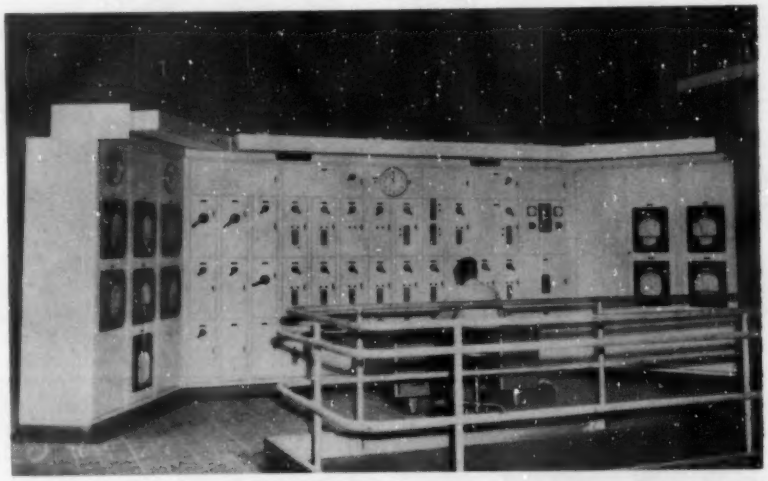
At the time the new program got under way, flows to the old plant averaged around 32 mgd. The state health department determined that intermediate treatment was required to reduce the pollution load on the lake. Thus the old primary plant had to be enlarged and aeration tanks added to provide a short period of aeration for the settled sewage. The number of aeration tanks used will depend on the flow, as determined by the works engineer at Erie. Realizing that full aeration might be required at some future time, pertinent features of the new facilities are designed for ease of conversion.

Sewage strength design basis of the new plant is 150 ppm BOD, and 175 ppm SS; reductions through the plant of 65 to 70 percent are expected. Industrial wastes are typical for Erie's size, and no special service charges are made. Design flow of the enlarged plant has been assumed at 45 mgd anticipated from 200,000 persons in 1975. Hydraulic features of the plant will accommodate a maximum flow of 120 mgd through grit chambers, screens and primary tanks; and 90 mgd through the aeration tanks. This allows for unusual peak flows and expansion of facilities when required. The existing intercepting inlet sewer to the plant has a capacity of 120 mgd. Here are listed the chief components of the enlarged plant:

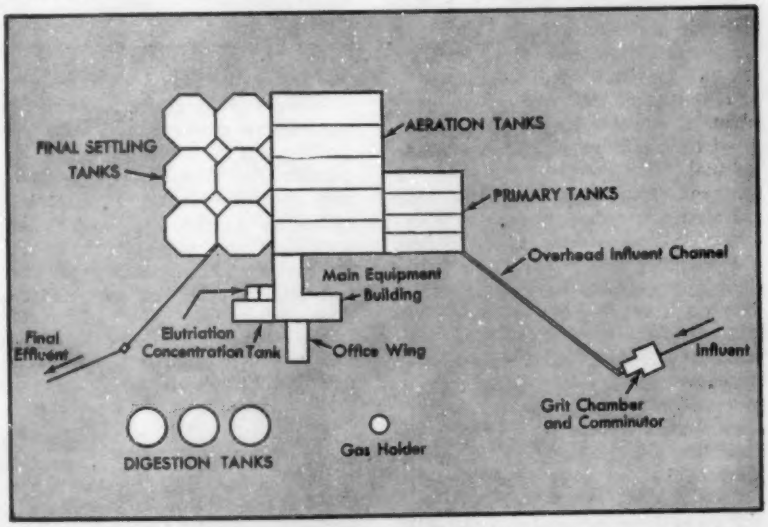
1—Coarse bar screens with 4-inch clear openings.

2—Grit chambers with swing type aeration equipment and mechanical grit removal facilities.

3—Sewage comminutors for shredding all coarse material in the sewage flow.



● **MAIN CONTROL** panel is located in the pump building. Dials and gages record plant performance and permit operator to control plant operation from this office.



● **FLOW DIAGRAM** showing principal units of the Erie Sewage Treatment Plant.

4—Reinforced concrete flow channels equipped with sluice gates so that sewage can be routed as desired to the various settling units.

5—Four new reinforced concrete rectangular settling tanks, each 41 ft. wide, 135 ft. long and 8-ft. deep, equipped with mechanical sludge collectors and mechanical scum removal. The new tanks will have a rating of 22.5 mgd; the old tanks will have an equal capacity, as reconditioned.

6—Five reinforced concrete spiral flow aeration tanks, each 30 ft. wide, 15 ft. liquid depth, and 360 ft. long. Air diffusion equipment for aeration will be porous diffuser tubes with swing type headers to permit servicing of single units without interruption of operations.

7—Six reinforced concrete final settling tanks, octagonal in shape and 103 ft. across with 12-ft. liquid depth. Each tank will be equipped with mechanical sludge removal equipment of the suction type.

8—Main equipment building constructed of reinforced concrete and brick and stone masonry with vacuum sludge filtering equipment, air compressors driven by dual fuel engines and chlorine equipment.

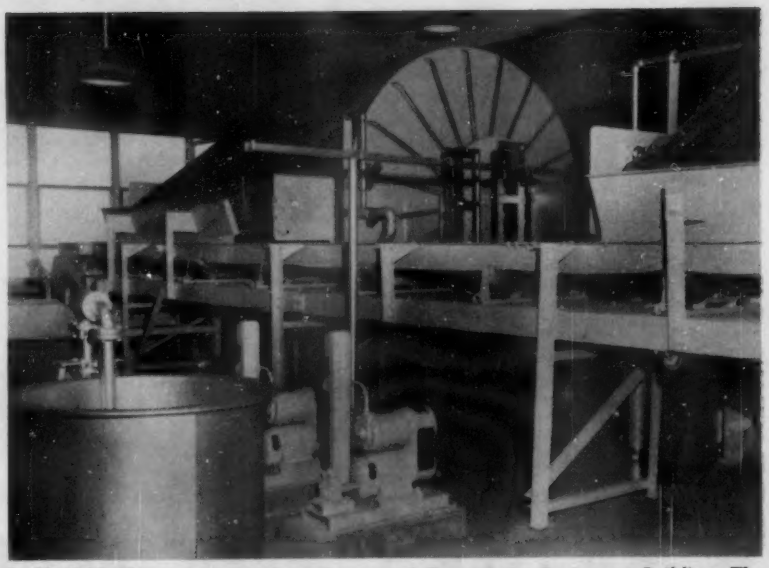
9—Gas storage sphere for equalizing the supply of sewage gas which will be collected in the digester to furnish about 90 percent of the fuel requirements of the plant.

10—Miscellaneous structures, equipment, and appurtenances necessary for accurate and flexible control of the treatment process.

At present, no new digestion tanks are included, although the construction contract includes financing arrangements for these, if required. The city is experimenting with a new accelerated method of sludge digestion, the Catalytic Reduction Process, in one of the existing digesters. If this method is applicable to local conditions, no additional digestion tanks will be required.

Treatment plant effluent will be routed into an existing 72-in. lake outfall sewer, discharging into the open lake 10,000 ft. northeast of the shore. As the general flow in Lake Erie is west to east, this point of discharge is favorable for protection of the city water intake located several miles to the west.

Estimated operating and maintenance costs of this plant for 1956 total $130,000, as follows: Labor and salaries, $65,000; power $12,000; chemicals, water and fuel $20,000; maintenance and supplies $14,000; administrative expense and supervision of collection $16,000; and operational contingencies $3,000.



● **SLUDGE filters are located on the second floor of the Equipment Building. The three filters are each 8 ft. diameter and 10 ft. long, with 750 sq. ft. total area.**

CONTRACTORS AND EQUIPMENT MANUFACTURERS

Contractors

General Construction:
Rust Engineering Company

Steel Fabrication:
Levinson Steel Company

Electrical Work:
Lake Erie Electric Company

Heating and Ventilating:
R. E. North Company

Plumbing Work:
Spaeder Engineering Company

Paving Work:
E. E. Austin Company

Equipment Manufacturers

Chain Belt Company:
Collector mechanisms and accessories, final and concentration tank collectors

Chicago Pump Company:
Sewage screens, air diffuser equipment, lift pumps (2 @ 75 mgd), primary sludge pumps (2 @ 200 gpm)

Fairbanks, Morse & Company:
Return sludge pumps (4 @ 4,000 gpm), chlorine scales

Wallace & Tiernan, Inc.:
Chlorinators (3 @ 4000 lb/day)

Ralph B. Carter Company:
Sewage ejectors and accessories (2 @ 100 gpm)

Chicago Bridge & Iron Company:
Gas storage sphere (45-ft. dia)

Chicago Pneumatic Tool Company:
Gas compressor (150 cfm @ 40 psi)

American Air Filter Company:
Air filters—45,000 cfm

Nordberg Manufacturing Co.:
Dual fuel engines (3 @ 620 hp)

Read Standard Corporation:
Blowers, engine drives and accessories (3 @ 15,000 cfm)

Foster Engineering Company:
Flow tubes (10" to 36")

Penn Instrument Division:
Meters and recorders

Komline-Sanderson Eng'g Corp.:
Sludge filters and accessories (3 @ 8 ft. dia. x 10 ft. face)

Chapman Valve Mfg. Company:
Sluice gates

Darling Valve & Mfg. Company:
Major gate valves (8" to 36")

S. Morgan Smith Company:
Butterfly valves (6" to 24")

U. S. Pipe & Foundry Company:
Cast iron pipe

Kewaunee Manufacturing Co.:
Laboratory furniture

Louden Machinery Company:
Cranes (1 to 20 tons)

American Monorail Company:
Hoists and trolleys

Orr & Sembower:
Boiler (oil and gas)

Buffalo Forge Company
Miscellaneous fans

Penn Ventilator Company:
Ventilators

Trane Company:
Unit heaters

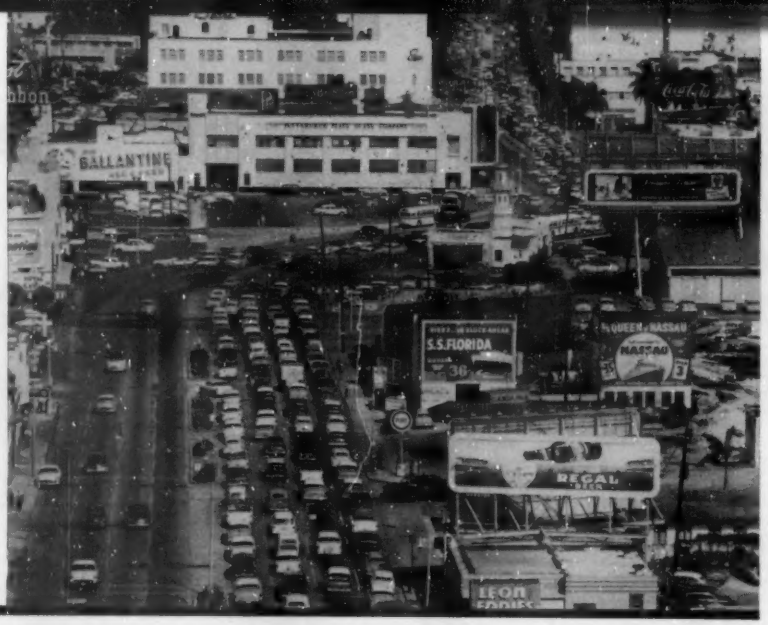
Vulcan Radiator Company:
Convection radiators

Minneapolis-Honeywell Regulator Co.:
Heating controls

Buffalo Tank Corporation:
Tanks for oil storage, mixing, ferric chloride, etc.

Detroit Steel Products:
Roof and paneling

A MASTER TRAFFIC plan, the first that the City of Miami, Florida has ever had, was recently devised by Arthur Darlow, director of engineering, and George H. Kunde, director of traffic engineering, and has been put into effect. The plan consists of two phases. The initial phase is an arterial street program involving reversal of traffic on those downtown streets which were already one-way thoroughfares and development of parallel pairs of four-lane, two-way arteries. This part of the project will involve some street widening and paving and some right-of-way acquisition at an estimated cost from $5,000,000



A MASTER TRAFFIC PLAN FOR MIAMI

to $10,000,000. The second phase of the program is a long-range plan, not yet complete in all details, but involving a number of expensive projects. It had long been apparent that some stern remedies would have to be applied before any of these long-range projects could be brought to completion.

For several years the Miami area has been painfully aware of its traffic headaches. Last year discussions reached a climax with a welter of proposals, many of which were of the long-range variety, offering no immediate relief. What was needed was something that would facilitate traffic flow until such time as the more ambitious projects could be built. The master plan devised by Darlow and Kunde is expected to double the capacity of Miami's downtown streets. Before adoption it was endorsed by city and county officials and boards. Miami's traffic problem is in reality not merely a city problem but a county problem because nearly all traffic that enters the county filters down into the Miami business area at one time or another.

While every city has its traffic problems, Miami's are compounded by the fact that a huge tourist volume is poured into the area. Resident population alone creates a traffic problem even when there is a minimum of tourists around. With tens of thousands of additional cars in the area during peak tourist periods, there is an aggravated situation. The Miami City News Bureau estimates that the Miami area has 3,000,000 visitors a year, many of whom arrive by automobile. In Dade County, which comprises the Greater Miami area, there is a registration of about 370,000 cars and trucks for a resident population of 703,000 (a recent U.S. Census Bureau check), or more than one vehicle for every two residents. This places Miami in a top bracket in automobile ownership in the entire country.

● **CLOGGED streets and traffic jams are common to almost every city these days. This article tells of the steps undertaken by Miami to alleviate this situation.**

One of the major steps in the new arterial program affects SW 8th Street, otherwise known as the Tamiami Trail or US 41, a highway that feeds into Coral Gables and southwest Miami besides carrying a large volume of tourist traffic. This highway, which has been a two-way street, has been coupled up with SW 7th Street, a little used thoroughfare, for a considerable distance. East bound traffic will take Eighth Street and west bound Seventh Street. The city engineering department had estimated that to widen Eighth Street to 106 ft. from its present width of 70 ft. would have cost $1,550,000 a mile, including acquisitions for right-of-way, and that this widening would increase traffic flow only from 900 to 1,500 cars an hour whereas the pairing of the two streets can be accomplished for $150,000 a mile and will increase car flow to 3,000 an hour.

More out-of-town and out-of-state cars travel Biscayne Boulevard (US 1) than any other route in getting in and out of Miami and Miami Beach. On top of the tourist travel is a heavy local traffic. The city plan includes amelioration of the serious bottlenecks on this route, one at the Seventy-ninth Street causeway approach to Miami Beach and the other at Fifteenth and Thirteenth Streets, where left-hand turns had been permitted to the Venetian and MacArthur causeways, which lead to Miami Beach.

To remedy the Biscayne Boulevard traffic situation, the city engineers devised two separate plans. Traffic flow between Fifty-fourth Street and Eighty-seventh Street is to be divided. Southbound traffic will take NE Fourth Court, which will be developed as a main artery; and northbound traffic will use Biscayne Boulevard, which between the two points mentioned will become a one-way street. In peak

C. E. WRIGHT

hours it has taken automobiles as long as twenty minutes to cover this distance.

At the Venetian and MacArthur causeway entrances, there is to be a new traffic pattern. Right turns on red lights, which had not previously been permitted, will enable motorists to circle the block and cross Biscayne to make a direct approach to the causeways. Any other solution, it was figured, would involve very expensive right-of-way purchases in a built-up area.

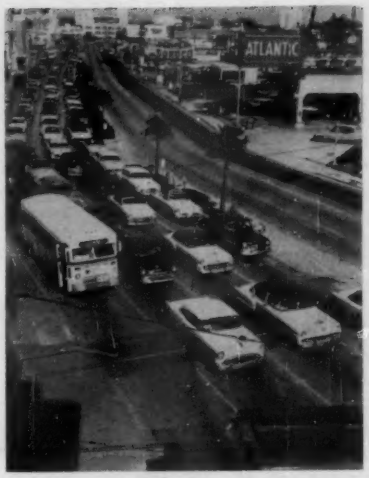
Another important pairing of streets will facilitate traffic flow to and from the Miami International Airport. NW Thirty-sixth Street, which has been a two-way thoroughfare to the airport, will be paired with NW Thirty-fifth Street, with westbound traffic moving on Thirty-sixth and eastbound on Thirty-fifth. This re-routing of traffic will be an important forerunner of a proposed Thirty-sixth Street causeway over Biscayne Bay to Miami Beach, connecting with Forty-first Street in Miami Beach, for which the State Road Department has already obtained rights-of-way.

A much-discussed alternate project, which the Dade County Commission favored, was an elevated toll highway from the airport feeding into the Venetian Causeway. This is one of the suggested projects that has apparently fallen into the discard, not only because of its cost but because of local sentiment against elevated highways of any type within the city limits. The State Road Department received many protests when it proposed a $150 million elevated highway over the tracks of the Florida East Coast Railway down through the center of the city. Chief objections were that it would create a "Chinese Wall" and blight a mid-city area.

Miami city officials and the Dade County Commission, with the aid of the State Road Department and the U.S. Bureau of Public Roads, are working on a long-range plan to take care of the time when the current city arterial road plan will not accommodate all of the traffic. Miami and Dade County, one of the fastest growing areas in the United States, will have to work fast to keep up with growth, but some of the contemplated projects cannot be completed soon enough to solve the immediate problem. An idea of current congestion in some parts of the city is shown by the fact that about 53,000 cars a day pass over the Miami River bridge on NW 27th Avenue, a larger number, for example, than the 43,000 cars expected to use the Liberty tunnels in Pittsburgh.

The Dade County plan, still subject to some changes, involves construction of 139 miles of limited access highways for fast, unhampered traffic through and around the Greater Miami area. A close working arrangement between city and county has become essential because once a motor vehicle enters Dade County it is likely to find its way into the downtown congested area.

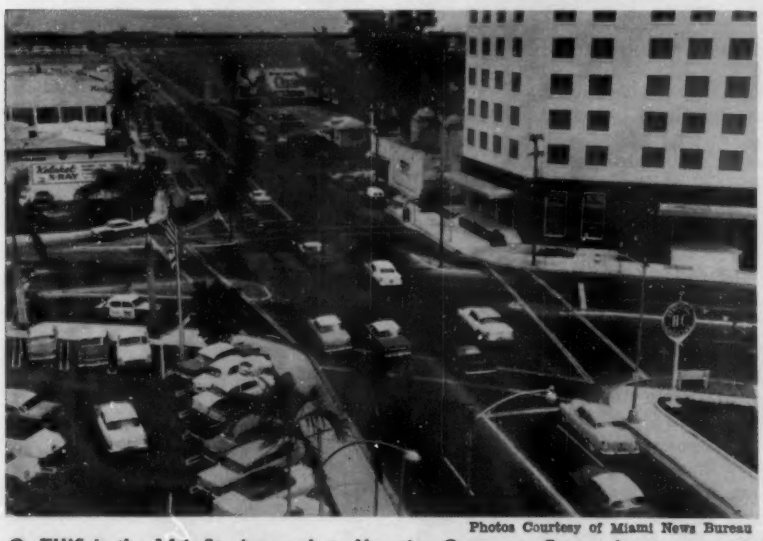
A part of the look-ahead planning of the city and county involves a proposed Riverside Throughway from LeJuene Road and Thirty-sixth Street, near the Miami International Airport, along the Miami River. This project has received general endorsement. Planning also concerns the traffic that will flow from the new toll turnpike at its southern end. This turnpike will feed into the city at the Golden Glades Interchange at 125th Street and near the $200,000,000 Inter-American Cultural and Trade Center (called Interama for short) near Biscayne Boulevard.



● **TRAFFIC congestion in Miami will be ameliorated by master traffic plan.**

When the turnpike that is being built between Fort Pierce and Miami is completed, approaches to be used are Sixth and Seventh Avenues NW and the 125th Street approach to the Broad Causeway leading to Miami Beach. An expressway connection is envisioned for the time the statelong turnpike is completed some time hence. It would cost about $50,000,000 and run from the turnpike terminus to the Miami River, with a high-level bridge to the causeways.

The really grandiose scheme in Miami's future, however, is the Malecon (a name derived from a similar structure at Havana, Cuba) which would be built out in Biscayne Bay about 1,000 to 2,000 feet from the Miami shore, possibly to be connected eventually with bridges and causeways from MacArthur Causeway to Virginia Key, Key Biscayne, Soldier Key, Elliott Key, Rhodes Key and Key Largo. This Key Largo Causeway, highly favored but still far from getting started, would cost an estimated $37,000,000, including a high-level bridge from Miami Beach to Fisher's Island. The serious discussion of it illustrates how Miami is dreaming about its future. It is confidently predicted that Dade County will have a population of about one million when the 1960



Photos Courtesy of Miami News Bureau

● **THIS is the 14th St. Approach to Venetian Causeway. Former heavy congestion in this general area has been alleviated by adoption of improved traffic patterns.**

census is taken. This doesn't count, of course, the ever increasing number of tourists.

One of Miami's biggest traffic battles has been the long drawn-out effort to oust the tracks of the Florida East Coast Railway from the city center. This has got into the courts but without the results Miami had hoped for. A terminal in the northwestern section of the city and the tearing up of the downtown tracks have been the objectives of a vigorous campaign, which has been hampered by the fact the road is in trusteeship under United States courts. If success is ever achieved, some of Miami's downtown traffic problems, caused by closed streets and shunting of trains, will be alleviated.

Meanwhile, the city engineering department is convinced that its arterial street program will afford immediate relief. On the arterial pair system of through streets turns right or left will not have to be restricted and there will be more explicit signals to direct an even flow of traffic.

Miami and Miami Beach are also resolutely attacking the parking problem. Miami has appropriated $1,000,000 to subsidize off-street parking facilities and has indicated a willingness to put up another $500,000. In the area extending from the bay to NW Second Avenue and from the Miami River to NW Sixth Street there are now 106 parking lots and several parking garages which together provide about 12,000 parking spaces. At Miami Beach the city now operates about fifteen municipal parking lots accommodating 5,000 vehicles. These are self-liquidating notwithstanding high land values.

WATER SUPPLY RESOURCE PLANNING

Questionnaires Provide Basic Municipal Data for Missouri River Basin

RALPH PORGES

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THE GROWING water demand, which has motivated the river basin concept of water resource conservation and development, requires that health departments and water works people evaluate most carefully the adequacy of the source of their water supplies if municipal needs are to be considered in long-range planning for multiple water use. The Public Health Service solicited data from State Health Departments in the Missouri River Basin to further planning efforts and to provide basic data for future resource evaluation. It is hoped that the presentation of the data collected may stimulate collection of such information in other areas. Also, extrapolation of data may indicate areas of concern in regard to the sources of our municipal water supplies.

The Missouri River Basin Development Area is one of the large watersheds actively under development. To implement the Basin development program, over 100 major dams will control the waters of the Missouri and its tributaries. In addition, land and water conservation measures in the upland regions are being planned to retard and conserve surface run-off. Numerous irrigation canals will provide water for other uses where, at present, existing sources may be inadequate or non-existent. To indicate the water needs of the Basin, the following uses are cited [1,2]: for 204 municipal surface water supplies using more than 465 mgd.; for industrial cooling and processing 2,000 mgd. for removal and ultimate disposal of the liquid wastes of 1,073 municipalities and 332 industrial plants; for navigation in the main stem of the Missouri from Sioux City to its mouth requiring a discharge of 25,000 to 30,000 cfs.; for irrigation of 12 million acres; for power generation to the extent of 4 billion kwh. annually; for recreation amounting to 15 million man days annually; for commercial fishing; and for water consumption by farm animals. Ground waters supply 1,336 municipal systems with nearly 195 million gallons each day, numerous industries, a small part of the irrigation demand, and considerable livestock water. These needs are for the most part current and do not reflect ultimate requirements.

The multiplicity of water uses necessitates that recognition be given to all legitimate demands. And since planning must take into account ultimate development, reasonable forecast for future needs must be made.

Method of Procedure

Because this study was focused on resource planning, it was apparent that facility adequacy would shed little light on the adequacy of the water source. In the past, some surveys have failed to differentiate between water shortage due to inadequate treatment plants and distribution systems and shortages in the source of supply.

To assure complete understanding of the data desired, the Missouri Drainage Basin Office, Public Health Service discussed the needed information with the State Sanitary Engineers of the 10 Basin States, offering their full support of the project. The requested information

included the data discussed below. The communities were listed with their 1950 Census Population and average consumption in million gallons per day. Water quality was considered only in terms of chemical and physical characteristics. Adequacy data, present (1955) and future (1975), were related entirely to the source of the water.

The data for each community were compiled from existing records and were submitted to the State Sanitary Engineers who reviewed, revised, corrected, and completed the basic information. It is a tribute to the State Sanitary Engineers that 100 percent completion was achieved. In many instances, supplemental data of value were also supplied to indicate why water quality was unsatisfactory such as excessive iron and manganese or high total solids.

Results of Study

The area under consideration included the Missouri River Basin and the Souris River—Devils Lake—Red River of the North region linked to the Missouri River Development by proposed water transference from the Missouri River to the Red River of the North. In the entire Basin as delimited above, 1,562 sources of municipal water supplies were reported.

The data obtained indicated the source of supply, quality evaluation, and quantity adequacy at present (1955) and in the future (1975). The summations were by number of communities, their 1950 Census populations, and average consumption.

Source of Municipal Water

In the Missouri Basin Development Area, there are 1,562 municipal supply sources using 682 million gallons of water daily. The 1950 United States Census Population of these communities approached 5,512,000. Since no attempt was made to ascertain the population served, a per capita value unless qualified might be misleading. With this understanding, a rough approximation obtained from these statistics shows about 124 gallons per capita per day as compared to an estimate of 140 gpcd for the whole country[3]. It is probable that if the usage were based on population served, the per capita consumption for the Missouri Basin would be less than 124 gallons.

Surface sources serve 204 prime facilities or 13.1 percent of the supplies and they supply over 465 million gallons daily, or 68.2 percent of the total municipal demand. Some of the larger communities may serve other municipalities not included among those listed. Ground sources serve 1,336 (85.5 percent) with 194 million gallons, or 28.5 percent of the total demand. Few communities tap both ground and surface sources; 22 are listed, using 22.2 million gallons daily.

Thoman[4] shows that in the entire United States 29.6 percent of the communities serving 54.6 percent of the population use surface sources. In the Missouri Basin, there are fewer surface sources but the percentage of population served by such waters is larger.

Water Quality

Over 23 percent of the communities serving 11 percent of the population reported water as being unsatisfactory as to chemical and physical quality. Surface sources were satisfactory for 91.7 percent of the communities using 95.6 percent of the surface water while 74.1 percent of ground sources using 80.9 percent of the ground water reported satisfactory quality. This would indicate that in this area ground waters are generally less satisfactory than surface sources, usually because of greater mineral content. Specific comment revealed excessive iron, manganese, total solid., chlorides, fluorides, or sulfates in ground waters.

The unsatisfactory quality of surface water appears related primarily to taste and odors although these relationships were not fully evaluated. Gross municipal and industrial pollution was responsible for at least one surface supply being declared unsatisfactory from a physical standpoint.

An evaluation of waste discharges in relation to the larger surface water supplies was made. The surface water sources selected were the 51 in the Basin listed in the "Inventory of Municipal Water Facilities for Larger Communities (1954)" issued by the Public Health Service[5]. In 1954 these 51 communities served over 3,414,000 people, a large proportion of the population indicated having surface sources. Of these, 22 supplies serving 876,000 people, were received from waters not subjected to upstream discharges of sewage or industrial wastes. Six sources, serving 884,000, were taken from streams having sewage discharges only, while 17 sources serving 1,520,000 were from waterways carrying both sewage and industrial wastes; six supplies, serving 136,000, were taken a considerable distance downstream from any waste discharges. Thus 23 of 51 or 45 percent of the specified sources serving 70 percent of the people were from streams used for the conveyance of sewage or industrial wastes.

● **FORT RANDALL Dam, one of the many structures built by the Corps of Engineers on the Missouri for flood control, power production, navigation and water supply.**

Of the ground water sources, 25.9 percent are of unsatisfactory quality, and, in many instances, the cost of rendering these satisfactory might be prohibitive. These provide 19.1 percent of the ground water consumed. Recourse to existing surface sources or to new surface sources is indicated. The value of water resource development and flow routing to satisfy these demands can be considered in the over-all resource planning program. Large benefits may accrue to a de-

velopment program providing for municipal water needs. Also, pollution control to protect water quality is important as a conservation method.

Present Water Quantity

Of the 1,562 water sources, 1,337 (85.6 percent) using 95.0 percent of the water served reported their sources as adequate in terms of current demand; 171 reported inadequate s urces; and the adequacy of 54 were unknown. Of the surface sources 77.4 percent and of the ground sources 86.9 percent reported adequate supplies. However, on a demand basis, surface water sources serving 96.6 percent and ground water sources serving 90.7 percent were declared adequate. This indicates that the smaller surface supplies probably in headwater regions are experiencing shortages, while somewhat larger communities dependent on ground sources are also suffering shortages. The fact that smaller communities, less able to secure and provide water supplies, are most liable to suffer from water shortages points to the need for considering carefully water resource development to assist wherever possible in this problem.

Future Water Adequacy

The anticipated adequacy of the Basin water supplies in the year 1975 was based on reasonable municipal growth and industrial development. For example, the United States Census[6] estimated that the nation's population on July 1, 1955 was 165,248,000. The July 1, 1975 estimates vary from 198,600,000 to 221,000,000. An increase to 210,000,000 would represent a 27 percent increase in the 1955 population.

It is estimated that 64.9 percent of the community water sources, serving 69.3 percent of the demand, will be adequate in the year 1975. A total of 193 (12.3 percent) reported that their water sources would be inadequate in the future; 229 (14.7 percent) reported that the adequacy of source was doubtful; and adequacy of 126 (8.1 percent) was unknown. On a consumption basis 5.2 percent were inadequate, 18.9 percent doubtful and 6.6 percent unknown.

In regard to surface sources only, 62.8 percent serving 69.6 percent of the surface water users were expected to be adequate; 13.2 percent of the surface sources were reported inadequate; 10.8 percent were doubtful and 13.2 percent unknown. Inadequate or doubtful sources represented 24 percent of the demand.

With ground water, 65.5 percent of these sources were believed adequate for future demands representing 72.2 percent of the ground water use. Inadequate, doubtful adequacy, and unknown were 11.9, 15.3, and 7.3 percent respectively.

The future picture is not good. Over one third of the water sources in the Basin supplying over 30 percent of the water demand may not be adequate within 20 years. Both surface and ground sources share this outlook. The relatively large percentage of supplies of doubtful and unknown adequacy is important. This emphasizes the need for sufficient basic data to assess more clearly the water resources. Stream gaging and ground water explorations should be expanded to permit establishment of safe yields. It also emphasizes the need for those concerned with municipal supplies to become more familiar with details of the water source.

Water source adequacy data for the Missouri Basin points to a vitally important need which may be met by water conservation and development programs. Such demands should be considered in the fundamental plans and provisions made to retain claim on that water for the specified future need. This represents a problem, for no mechanism has been established whereby a claim may be held for a need several years hence.

Conclusions

It is believed that the types of municipal water problems in the Missouri River Basin, in a general sense, are similar to those in other river basins although the degree will vary with the area concerned. If such is true, the data do point out some problem areas. For example, 23 percent of the communities in the Missouri Basin have water sources of undesirable chemical and physical quality. In addition, 45 percent of the surface sources serving 70 percent of the surface water demand are from streams conveying sewage and industrial wastes. Over 14 percent of the communities reported that present municipal water sources were inadequate or of unknown adequacy. Many of the smaller communities less able to develop reliable sources are those suffering shortages. By 1975, it is estimated that 35 percent of the water sources would be inadequate or of doubtful adequacy with regard to quantity. This indicates the need of long range planning to provide for future municipal needs that are continuing to expand.

Water resource development programs should consider these ultimate municipal requirements and with some procedure established whereby future water claims can be set up and reserved for that use. This represents a challenge to all in the conservation and development of our water resources.

The high percentage of doubtful and unknown evaluations indicates need for (1) much more basic data such as stream gaging, ground water explorations, and ground water and stream quality analysis, and (2) greater familiarity by water works officials with the source of municipal supplies. Basic data collection must be expanded and maintained over long periods of time to develop adequate records for planning purposes.

Acknowledgment—Since the basic data pertaining to municipal water supplies were collected by or through the State Health Departments, recognition is made of the cooperation of the State Sanitary Engineers of the States of Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. Special acknowledgment is tendered Sanitary Engineer Director, Glen J. Hopkins who was the Officer-in-Charge of the Missouri Drainage Basin Office and who contributed so much to the collection of the data upon which this report was based.

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RESEARCH

ON TRICKLING FILTERS:

ALTERNATING DOUBLE FILTRATION

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DURING their first complete year's work carried out in their new Water Pollution Research Laboratory at Stevenage, Herts, England, the British Water Pollution Research Board have, among other things, undertaken some interesting investigations into percolating filters for the treatment of sewage, including reversible recirculation and loading rates.

These laboratory experiments may be classified as research into the oxygen requirements of percolating filters; the efficiency of micro-organisms in percolating filter sewage treatment; the effect of bacteriophage; the treatment of sewage containing detergents; and the treatment of sewage by alternating double filtration.

For their experiments on oxidation the researchers assumed that, if this process in a filter working efficiently without ponding is limited by the supply of oxygen, it is caused, not by lack of gaseous oxygen in the interstices of the medium, but rather by the rate at which it can be transferred from the interstitial atmosphere, through the film of liquid percolating through the filter, to the biological film beneath.

To ascertain the effect on the operation of a filter of reducing the oxygen content of the interstitial atmosphere, three experimental filters were used. Each was 5 ft. deep, 3 in. in diameter and packed with ½-in. to ¾-in. gravel. A solution consisting of water, nutrient broth, urea, dextrin, starch, glucose, ammonium carbonate and nutrient salts, was applied each six minutes. The gases containing different proportions of oxygen were circulated by pump through a system which included an absorber to remove carbon dioxide and a gas sampling tube. In filter 1, normal air (oxygen content about 20.6 percent) was used; in filters 2 and 3 the gas was a mixture of nitrogen and air and contained respectively about 6 percent oxygen and 2 percent oxygen. The liquid treated contained approximately 200 ppm organic carbon and 63 ppm total nitrogen. The rate of application was equivalent to 50 to 60 gallons per cubic yard per day.

Although the efficiency of filters 2 and 3 decreased slightly with decreasing oxygen content, neither the proportion of organic carbon removed nor the amount of carbon oxidized was affected to any great extent. During the maturing of the filters, however, nitrification began much earlier in filter 1 than in the other two. In filter 3 nitrification was almost inhibited. Results of this experiment were as follows: With influents with nitrogen contents, in mg per day, of 57.8 to 61.4 for ammonia; 0.2 for nitrite; and from 5.2 to 5.9 for nitrates. Effluent values were: Filter 1, with 20.6 percent oxygen, 9.6, 3.0 and 36; filter 2,

● **FILTERS, effluent channels and primary humus tanks of the Bedford alternating double filtration plant are shown here. A flow diagram appears on the following page.**

with 6 percent oxygen, 30.4, 4.4 and 20.7; and filter 3, with 2 percent oxygen, 57.0, 3.5 and 9.7.

When the experiment was stopped as filter 1 was beginning to pond, the three filters contained about the same total weight of biological film, but in filter 1 a larger proportion of the film occurred near the top of the filter. This probably affected the earlier ponding of filter 1. The researchers regarded this with interest since possibly some factors, such as periodicity of dosing, may affect ponding by influencing distribution of oxygen at different depths.

Having in mind that it might ultimately be possible, by changing the method of operating filters, to control the relative proportions of fungi and bacteria in the biological film, the Water Pollution Research Laboratory at Stevenage has sought to ascertain the relative rates at which a given weight of fungi and bacteria bring about the oxidation of organic matter and the relative rates of increase of cell material which result, in the two types of organisms, from the oxidation of a given quantity of nutrient.

The two zoogloeal bacteria, designated as Nos. 10 and 8, showed a maximum growth of dry matter of 40 and 38 mg; glucose consumed in mg, of 160 and 143; and an economic coefficient of cell synthesis (growth x 100 ÷ glucose consumed) of 25 and 27. In comparison, results with fungi were as follows for maximum growth, glucose consumed and economic coefficient: For Geotrichum sp. (Oospora), 85, 225 and 38; for Sepedonium n.sp., 112, 206 and 54; for Trichosporon cutaneum (Sporotrichum), 140, 230 and 61; and for Fusarium aqueductum, 130, 212 and 61.

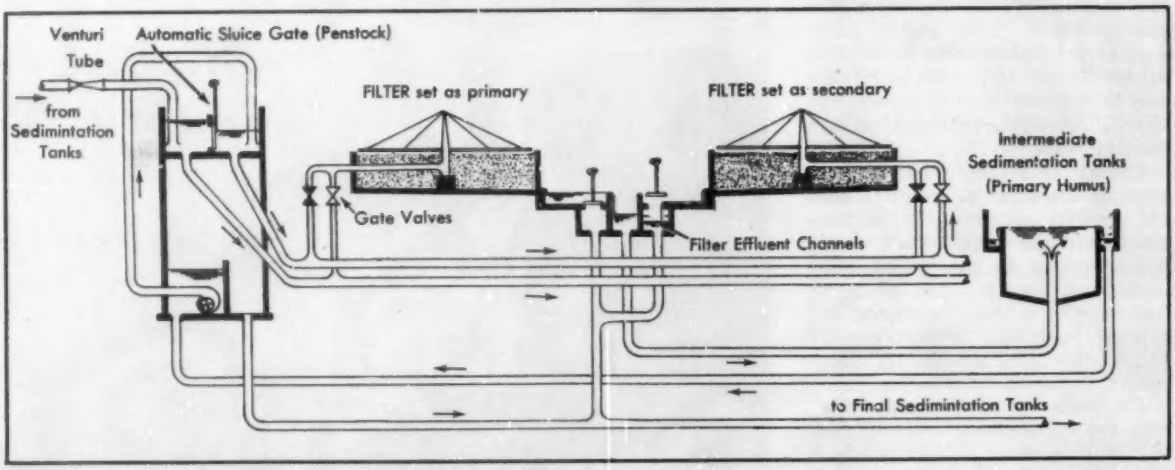
The comparative rates at which glucose was destroyed by aerated suspensions of these organisms in solutions containing 200 ppm of the sugar was determined. The zoogloeal bacterium No. 10 showed a rate of utilization of glucose of 59 ppm/hour. The other organisms listed in the previous paragraph showed a descending scale of rate of utilization. The rate obtained by using the biological film from a percolating filter was comparatively low—14 ppm/hr., possibly because the film contained non-living matter and possibly also because the film, being compact, had a low effective surface area per unit weight.

The effect on coliform bacteria in various states of treatment at the works has also been studied, using eosin-methylene-blue agar at 37°C. Samples showed a reduction from 134,600 presumptive coliform organisms per ml in crude sewage to 4291 in filter effluent and 4962 in humus tank effluent. The reductions, though large, showed no consistency. Experiments to ascertain whether the reductions were due to the actions of bacteriophage showed that there was no increase in the numbers of bacteriophage present nor in the proportion of resistant bacteria. Also, only an insignificant increase in numbers of bacteriophage occurred when large quantities of bacteriophage-sensitive B. coli strain B were added to the crude sewage entering one section of the sewage works.

Detergent Removal

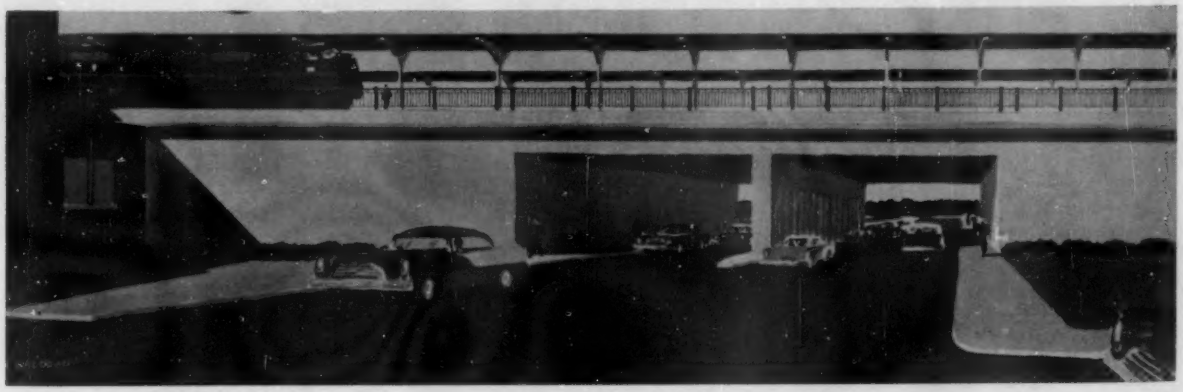
With the main object of determining the toxicities of detergent effluents, to fish, but also to show the percentage of synthetic detergent removed in a percolating filter treating sewage containing a detergent mixture, the Stevenage laboratory continued experiments begun at Watford. Two small-scale filters, each 6 ft. deep and 1.42 ft. in diameter were used, but as detergent-free sewage was no longer available the liquid applied was made artificially according to a standard formula. This consisted of water, fecal matter, urine, soap flakes, a little top soil, shredded paper, milk and tea. The mixture was prepared daily and was stirred and then allowed to settle before use. After the filters had been matured with this artifical "sewage", applied at a rate of 60 gal. per cu. yd. per day, a mixture of seven proprietary synthetic detergent washing powders was added to the sewage treated by one filter, the concentration added being equal to 26.5 ppm "Manoxol O.T." (sodium dioctyl sulphosuccinate)—a concentration probably much higher than that normally found in domestic sewage. When first applied, very little detergent passed through the filter; possibly a great deal had been adsorbed by

(*Continued on page* 169)



● **FLOW DIAGRAM used for the alternating double filtration plant. With pumps stopped, filters can operate in parallel.**

In preliminary experiments using typical bacteria and fungi found in filters, the growth rate of organisms and the rate at which they destroyed glucose were measured in quiescent culture in 25 ml of a medium containing 1 percent glucose, 0.5 percent peptone and the necessary salts, trace elements and vitamins. The "economic co-efficient," calculated as the ratio of the dry weight of growth to the corresponding weight of glucose destroyed, was much lower for the two zoogloeal bacteria examined than for the four species of fungi.



BETTER PUBLIC WORKS PROGRAM *for* JACKSON

A BOND ISSUE for $11,425,000 was recently voted by Jackson Mississippi. What it was needed for and the public relations program that assured a favorable vote—roughly 8 or 10 to 1—are of interest to all cities. The growth of the city has been most rapid—from 72,000 in 1945 to 120,000 at the present time. Moreover, this growth would have been impossible without the capital improvement program voted in 1949 which covered additional fire protection, more water, schools, street improvements, sewerage facilities and many other needed items.

In preparation for the new program, an information and public relations program was initiated and the voters were reminded that the decision in regard to a better and bigger city was theirs. At the election held in May, 1956, all items passed by a large majority: Water improvements by 7,167 to 1,030; street improvements by 6,766 to 1,382; fire protection by 6,986 to 1,293; and schools by 7,747 to 860.

What Improvements Cover

Fire—In the breakdown of the total bond issue, $700,000 will go for fire protection improvements which include the rebuilding of two fire stations; renovating two other fire stations; installing an adequate fire alarm system; and building a drill tower to help in the training of firemen.

Schools—The largest allocation, $4,225,000 will be used for the construction of 138 elementary classrooms and 14 secondary classrooms. This will require six new elementary schools and three additions to existing elementary and high school units. Cafeteria areas are to be enlarged; improvements to athletic facilities and the purchase of sites also figure in the $11 million improvement program.

Street—One of the most important phases of the plan involves an expenditure of approximately $2,500,000 for street improvements. Perhaps one of the most necessary of these improvements will be the Amite Street Thruway to West Jackson. When completed this will open a long-sought thoroughfare to the west from downtown Jackson, relieving traffic congestion in that area, but particularly in the vicinity of Illinois Central Railroad Station and throughout the entire business district. At least three important benefits are expected from the extension of Roach Street: Another feeder street will move traffic into the new Amite Street Thruway to the west; additional frontage for new stores will be provided along the route, and property values in the downtown area will be improved. A North West Street Extension will give traffic a direct route to Northside Drive and Hang-

● **DEAD END at Amite St. clogs traffic twice daily. Proposed underpass, shown at top of page, will beautify business district and improve downtown traffic flow.**

ing Moss Road and will eliminate a dangerous railroad grade crossing. More than 9,500 automobiles pass this point each day. From the west a Meadowbrook underpass will provide an interchange of traffic over streets beyond the railroad to State Street, Old Canton Road and U. S. Highway 51. Street plans also call for resurfacing work on a number of worn pavements in various sections of the City.

Water—Without an adequate supply of water, the growth of Jackson will be hindered in the very near future. The $4,000,000.00 water improvement program will add 15,000,000 gallons capacity to the water plant, bringing its normal daily capacity to 37½ million gallons. It will also provide two additional above-ground storage tanks, larger water distribution lines and an increased pump capacity. A low-head dam will assure adequate raw water at the pump intake area on Pearl River.

Election Salesmanship

When the improvement program for Jackson was first announced for the May 8 bond election, municipal officials expressed confidence of a winning vote. However, the fact was never overlooked that a fully informed public is a cooperative public, and a full scale Public Relations progra... was used to give the people complete and correct information about each phase of the building program.

The success of the bond election was, in a large measure, due to the enlistment of citizen participation. Groups were organized throughout the city by civic-minded individuals. These groups, in addition to contacting voters by telephone, delivering speeches and making personal pleas, actually paid for a large portion of direct mail advertising, outdoor advertising, radio and television programs and newspaper advertising.

Meanwhile, city employees continually talked up the program. At department head sessions each week, the Mayor and Commissioners gave full information and detailed facts about all phases of the bond election. The department heads relayed this information to their employees. Additionally, city employees were divided into groups for question and answer periods, thus enabling all municipal workers to give factual answers to questions from their families, neighbors and friends.

Brochure and direct mailing pieces were used. The Mayor, Commissioners and other personnel appeared before civic clubs and other groups, telling of the need for the improvements to be made. Day and night full city billboard coverage was used, with radio and television programs and spot announcements. Newspapers carried favorable editorial comments and printed many favorable news items.

As a result of the public relations program and the demonstrated need for the improvements, the bond issue carried easily.

The World's Longest Fluorescent-Lighted Street

WHEN New York City works on a project, it's likely to be done in a big way. That's what happened with the new lighting system on New York's Third Avenue. A total of 539 fluorescent luminaires have been installed along the 7½-mile stretch from Brooklyn Bridge to the Harlem River, making this the world's longest fluorescent-lighted street.

The new lights are spaced at 100-foot intervals on alternate sides of the avenue. Mounting height is 26 feet, and the luminaires are tilted upward at a 30° angle so that light is distributed uniformly across the 70-foot roadway. The luminaires, furnished by Westinghouse Electric Corporation, each house four 72-inch, 100-watt fluorescent lamps which provide an average of 0.8 footcandle of illumination on the pavement.

Standards used for the system are of galvanized steel, made by the Kerrigan Iron Works. Bracketed to the light standards at street corners are new street name signs, larger and easier to read than those previously used. In addition, they are mounted lower than the old-style signs so that now bus riders and motorists can readily see the signs from moving vehicles.

At the dedication of the new system it was specially noted that the installations are made of weather-resistant materials which will virtually eliminate need for maintenance to the structural assembly.

● **FLUORESCENT lights brighten the dusk as New York's Third Avenue lighting system is formally dedicated. Here Tomlinson Fort, vice president of the Westinghouse Electric Corporation apparatus division, takes part in dedication ceremonies.**

NEWS BULLETINS

AMERICAN PUBLIC WORKS ASSOCIATION, 1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

Local Committees Now Making Plans for 1957 Public Works Congress and Equipment Show

Philadelphia, Pa. — Several meetings have already been held by the Chairman of the local committees that have been organized to make arrangements for the 1957 Public Works Congress and Equipment Show, which will be held in Philadelphia, September 22-25.

David M. Smallwood, Commissioner, Philadelphia Department of Streets, is General Chairman of this forthcoming event which is being sponsored by the American Public Works Association. The Chairmen of the various committees that have been organized by the Philadelphia Metropolitan Chapter are as follows: Henry D. Harral, Supervisor of Municipal Assistance, Institute of State and Local Government, University of Pennsylvania, (Management Staff); Thomas A. Baldwin, Chief of Equipment Maintenance, (Exhibits); Samuel S. Baxter, Commissioner, Department of Water, (Inspection Trips); Harold H. France, Engineer of Operations, Department of Water, (Finance); Samuel J. Greenberg, District Engineer, Department of Streets, (Entertainment); Louis Schneider, Chief Engineer, Bureau of Highways, (Reception); Harold Andrews, Executive Vice-President, Philadelphia Transportation Company, (Transportation); Joseph Singer, Surveyor and Regulator, Department of Streets, (Housing); and Mrs. A. Michaels, (Ladies).

Brochures containing the space layout and contract forms for the Equipment Show will be mailed to all sustaining members during the month of February. Non-members of the Association will then have an opportunity to contract for exhibit space from March through July.

Street Usage and Maintenance Discussed at Chicago Meeting

Chicago, Ill.—Approximately 170 members and guests attended a luncheon meeting of the Chicago Metropolitan Chapter at the Edgewater Beach Hotel on December 6th. Al W. Konefes, Superintendent of the Bureau of Equipment Service for the City of Chicago, welcomed the members and guests to the meeting and called on Armon Lund, Superintendent of Public Works of Wilmette, to lead the discussion on "Street Usage and Maintenance." The first speaker was C. W. Albrecht, District Maintenance Engineer for the Illinois State Highway Department, who discussed the organizational set-up and the operating procedures followed in the maintenance of State Highways in the Chicago Metropolitan area.

The second speaker was Otis Rogers, Engineer of Streets for the City of Chicago, who explained how underground utility operations are coordinated in order to minimize their interference with street traffic. Representatives from all major utilities were in attendance at the meeting.

The meeting adjourned with the presentation of an attractive Past-Presidents' certificate to C. L. Baylor, Village Engineer of Downers Grove, who served as President of the Chapter for the past two years.

New Edition of Public Works Engineers' Yearbook Available

Chicago, Ill.—Copies of the 1956 Public Works Engineers' Yearbook were recently sent to all members of the Association as a regular membership service. A limited supply is available for distribution to non-members at the price of $5.00 per copy. Orders for this publication should be mailed directly to the headquarters office at 1313 E. 60th Street, Chicago 37, Illinois.

The Yearbook contains the Proceedings of the Fort Worth Public Works Congress and Equipment Show, a directory of APWA mem-

● MEETING of Chicago Chapter. Street usage and maintenance were discussed.

bers, local Chapter officers, committee lists and commercial announcements. The Proceedings include technical papers on a wide variety of subjects such as: Advance Planning of Public Works; Drainage Problems in Urban Areas; The Federal Highway Program; and Integration and Coordination of Public Works, plus many other topics of special interest to public works officials.

U. S. Bureau of Public Roads Issues New Parking Guide

Washington, D. C. — Cities and villages which are faced with traffic congestion problems will find a new publication just released by the U. S. Bureau of Public Roads to be of immense value. It was prepared by the B P R's Division of Research, and is based on extensive studies of the travel habits and parking problems of motorists in urban areas and the characteristics of parking facilities.

The 172-page publication, titled "Parking Guide For Cities," is only 55 cents per copy and may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C. It describes the action taken by a number of different sized cities to alleviate parking problems in their downtown business areas, and includes an authoritative discussion of the various steps involved in the development of adequate parking facilities.

Three More Companies Become Sustaining Members of APWA

Chicago, Ill.—Robert L. Anderson, President of the American Public Works Association, recently announced acceptance of three new applications for Sustaining Membership in this fast growing organization. These include the Plibrico Company of Chicago, who manufacture refractory products for incinerators, the International Salt Company of Scranton, Pennsylvania, one of the nation's foremost suppliers of sodium chloride for soil stabilization and ice control purposes, and the Neenah Foundry Company of Neenah, Wisconsin, which manufactures various types of cast iron products which are commonly used in the public works field.

This type of membership was especially established for organizations that wish to assist the APWA in its efforts to promote the advancement of public works engineering and administration. A total of thirty-five organizations now hold this type of membership which entitles them to many of the services provided to approximately 3,500 individual members of the Association plus special advertising and exhibit privileges.

Greeley Award Winner Retires

John B. Smith, a recipient of the Samuel A. Greeley Service Award at the recent APWA Congress in Fort Worth, Texas, has announced his retirement as Superintendent of Public Works for Glen Rock, N. J., after 37 years' service to that community.

Municipal Utility Official Named President of Arizona Chapter

Yuma, Arizona—The fall meeting of the Arizona Chapter of the American Public Works Association was held in Yuma last November 8 and 9, in conjunction with the Annual Convention of the Arizona Municipal League. Guy A. Rhoads, Manager of Municipal Utilities for the City of Safford, was elected President of the Chapter at its annual business meeting. John H. Brown, Assistant City Engineer of Tucson, was named Vice-President and Gerol B. Smith, Assistant Manager of Municipal Utilities of Safford, was elected Secretary-Treasurer. Others elected to the Executive Committee were: George W. Marx, Director and Chief Engineer, Bureau of Sanitation of the State Health Department, and William D. Williams, Director of Public Works of Clarksdale.

One of the highlights of the program was a panel discussion of "Traffic Problems" by John F. Caarls, City-County Traffic Engineer, Tucson; Charles Haley, City Traffic Engineer, Phoenix, and L. E. Thompson, Assistant State Traffic Engineer. Members and guests attending the meeting also took a field

SHOW THEM HOW TO MAKE BETTER SIGNS

One of a series of reports to Traffic Engineers and Highway Officials on

BETTER SIGN MATERIALS

FACTS ABOUT PLYGLAZE® AND PLYALOY® OVERLAID PLYWOOD

- **VANDAL RESISTANCE;** Report on DFPA Tests
- **REFLECTIVE SHEETING;** Look, No Prime Coat
- **TACOMA CUTS SIGN COSTS;** PlyGlaze Case History

vandalism tests

One of the first really definitive jobs of determining relative "vandal and abuse" resistance of standard highway sign materials was completed recently by the Douglas Fir Plywood Association Research and Engineering Department.

The results (see table) may prove something of an eye opener to anyone who assumed metal signs are stronger or more durable than overlaid plywood —or even ordinary Exterior plywood.

Actually, the tests show overlaid plywood has considerably more stamina, and maintains better message legibility after damage than either steel or aluminum. Glass fiber signs, apparently, just aren't in it when it comes to shrugging off abuse.

MATERIAL / TEST	OVERLAID PLYWOOD[1]	ALUMINUM[2]	STEEL[3]	GLASS-FIBER[4]
Flying objects	Fair	Fair	Fair	Fair
Knockdown	Good	Fair	Bad	Poor
Gunfire	Good	Poor	Bad	Fair
Bending (Machine)	Good	Fair	Good	Bad
Racking (Hand)	Good	Good	Very Poor	Very Poor
Average Rating	Good	Fair	Poor	Poor

1. OVERLAID PLYWOOD (both medium and high density) ⅝" thick, 5-ply. Weight: 7 lbs.
2. ALUMINUM—6061-T6 type .081" thick. Weight: 5 lbs.
3. STEEL—16 gauge bonderized. Weight: 11 lbs.
4. GLASS FIBER—resin bonded glass fiber approx. .0145" thick. Weight: 5 lbs.

The 24" square signs tested (steel, aluminum, glass fiber and overlaid plywood) were subjected to abuse under carefully controlled conditions. All (except glass fiber which was factory finished) were given recommended finishes with reflective sheeting on one face.

Tests included flying objects, gunfire, knockdown and bending. Ratings are based on extent of damage and legibility loss immediately after test; prolonged exposure would, of course, further impair legibility—particularly in the case of steel which rusts after protective coating is broken.

If you'd like a copy of the complete report (it's a 32-pager, complete with detailed procedures and photos) simply mail coupon.

no prime coat needed

One of the biggest advantages of PlyGlaze (high density overlay) is the fact that it requires no protective paint coating. Nor is any prime coat needed before applying reflective sheeting. The hard, plastic-like PlyGlaze surface provides an ideal base for permanent, weatherproof bonding. It will not check, blister or deteriorate when marred by bullet holes.

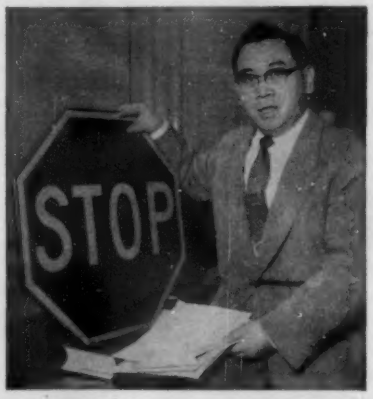
PlyAloy (medium density overlay) panels are recommended for non-reflectorized signs. If reflective sheeting is used, panel should be given prime coat.

case history

The City of Tacoma (Wash.) has sharply reduced costs by switching to PlyGlaze traffic control and regulatory signs. Of the city's almost 8,000 signs, 7,380 are PlyGlaze, and the others are being replaced as they are damaged. About 60% are reflectorized.

According to Yosh Kosai, city traffic engineer, the PlyGlaze signs have two important advantages: 1. *Cost;* based on current standards and specifications, PlyGlaze signs are less expensive than metal. 2. *Durability;* PlyGlaze signs last longer. Vandals can't wrap them around posts, nor do they chip or rust when struck by rocks or bullets.

The changeover was initiated by R. E. Schmidt, Kosai's predecessor. The first PlyGlaze signs were installed in 1951. After 6 years appearance and legibility remain excellent. The only significant damage has been from knock-down and



even though the posts had to be replaced, the signs themselves have remained in service.

description, specifications

PLYGLAZE:* Exterior plywood with high-density phenolic resin-fiber overlay fused to both sides of panel. Overlay is hard, glossy, abrasion resistant. Ideal base for reflective sheeting. Colors: buff, black.

Specification: PlyGlaze (B-B) 60/60 High Density Overlaid fir plywood, manufactured by St. Paul & Tacoma Lumber Co.

PLYALOY:* Exterior plywood with smooth, durable medium-density overlay on one or both faces. Overlay is ideal paint base; has texture similar to expensive drawing paper. Color: buff.

Specification: PlyAloy Medium Density Overlaid fir plywood, faced both sides (F2S) . . . or faced one side (F1S) . . . manufactured by St. Paul & Tacoma Lumber Co.

*Both PlyGlaze and PlyAloy meet U.S. Commercial standards, are DFPA-Inspected. Available in standard plywood sizes, thicknesses.

FOR MORE INFORMATION (detailed specifications, application data, etc.), **please mail coupon**

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trip to the Imperial Dam and other points of interest in the Yuma area.

One of the most important projects now being undertaken by the Arizona Chapter is the development of a "Model Ordinance on Utility Installations In Fringe Areas." This project has been assigned to a Committee headed by Dario Travaino, Superintendent of Water and Sewers for the City of Phoenix.

Tennessee Members Attend Annual Training Institute

Nashville, Tenn. — A total of 63 persons registered and participated in the 1956 Municipal Public Works and Building Officials Institute, held in Nashville, December 6-8. The Institute was sponsored by the Tennessee Public Works Association —which functions as an affiliated chapter of the APWA—and the Tennessee Building Officials Association. It was arranged in cooperation with Tennessee Municipal League and the Municipal Technical Advisory Service and Bureau of Public Administration of the University of Tennessee.

The Institute was planned to meet some of the day-to-day problems of city public works officials and building inspectors. Separate programs were held for each group. The Public Works group discussed air entrainment, Federal aid for the construction of sewage treatment plants, the expanded program of the new Federal Highway Act, asphalt curbs and new techniques in traffic control. The building officials had speakers and discussions on such topics as the expanding role of the building inspector, fire defenses, urban renewal and inspection of gas installations. To supplement the discussion groups, field trips were taken to urban renewal projects, sewer projects, the Nashville City Shops and the new Life and Casualty skyscraper.

The speakers at the 3-day meeting included: W. M. Leach, Commissioner, Tennessee Department of Highways and Public Works; Oscar King, Portland Cement Association; John B. Dunbar, Asphalt Institute; John Lee, Manager, Tennessee Inspection Bureau; E. U. Stevenson, District Engineer, United States Bureau of Public Roads; Herbert J. Bingham, Executive Director, Tennessee Municipal League; Gerald Grime, Executive Director, Nashville Housing Authority; S. Leary Jones, Director Stream Pollution Control, State of Tennessee; Philip Bell, Assistant Manager, Springfield Utilities Board; W. H. Mann, Traffic Engineer, Nashville; Linzy D. Albert, Director of State Planning, Tennessee State Planning Commission and Charlie Hawkins, Executive Director, Nashville and Davidson County Planning Commission.

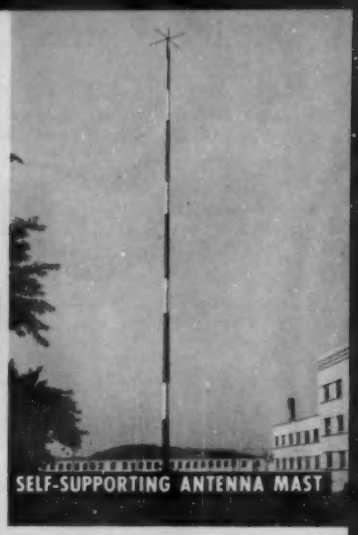
• • •

Cuba to Make Complete Aerial Survey

The Cuban government signed a contract with Aero Service Corp., Philadelphia for the air mapping of the entire island. The survey will begin early in 1957 and will be delivered late in 1958, and the entire project completed in 1959.

The new maps will aid the development of Cuba's oil and mineral resources. They will help define boundaries of concession areas held by oil and mining companies and provide other essential data for planning and development.

Scale of the new maps will be 1:50,000 with a 10 meter contour interval. According to Aero Service engineers, 324 map sheets, each 20 inches by 15 inches, will be compiled to cover the complete area. 5500 copies of each map sheet will be delivered, 1,663,000 maps in all.



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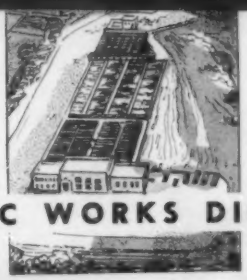


PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Sewage Treatment At Service Stations

On the New York State Thruway, service stations are so located as to be within 30 minutes drive of each other, and in only three cases could sites be selected near a municipal sewerage system. At the other 22 stations, the sewage is treated to meet standards set by the State Water Pollution Control Act, using comminutors, digesters, primary clarifiers and chlorine contact chambers. There are 19 trickling filters and 10 sand filters. Oily wastes from the service stations are not treated but are collected in drainage pits which are emptied periodically. Sewage can be run through these plants in five different ways, each beginning with comminution and ending with chlorination. In one method, all other processes are bypassed. In another, it goes to the digester for predigestion; and then bypasses the rest of the treatment. Or, after predigestion, it goes to a primary clarifier and then to a conventional secondary treatment unit. In the fourth method, primary clarification is followed by a trickling filter and secondary clarifier. In the fifth method, after comminution and predigestion, the sewage goes to a wet well to be lifted to a trickling filter and a secondary clarifier; followed when necessary by a sand filter. Hypochlorinators were used in the first five plants, but gas chlorinators in the others. Digested sludge will be pumped into scavenger trucks. Because the plants were overdesigned, recirculation at rates as high as 30 to 1 is being used.

"Sewage Treatment on the New York State Thruway." By Irwin P. Sander, Sr. San. Eng. of the Thruway. PUBLIC WORKS, January.

Variables in Sludge Filtration

The authors, believing that a study to determine the optimum operation conditions of vacuum filters required the use of both laboratory and pilot plant, conducted such a study, with special attention to the dry solids rate and cake moisture. The pilot filter was installed at the Michigan State College—City of East Lansing sewage treatment plant, and was a 4-ft. diameter by 2 ft. wide rotary filter. For the laboratory work, a filter test leaf was found preferable to the Buechner funnel commonly used. Study was made of the effects of cycle time, vacuum, and solids concentration on cake moisture; of filtration rate as a function of feed solids concentration, and of flocculant dosage; and cake moisture as a function of operating variables. On the basis of this study, they recommend that, in designing a filter plant, the designer investigate thoroughly the optimum sludge thickening methods to insure highest sludge concentration to the filter; provide sufficient flexibility to allow easy changing and control of the chemical addition; check the operation of several sludge filters on similar sludges; and consider the use of a vacuum control system, which can definitely reduce operating costs.

"Fundamental Operating Variables in Sewage Sludge Filtration." By Berne A. Schepman and Conrad F. Cornell, of the Eimco Corp. *Sewage and Industrial Wastes*, December.

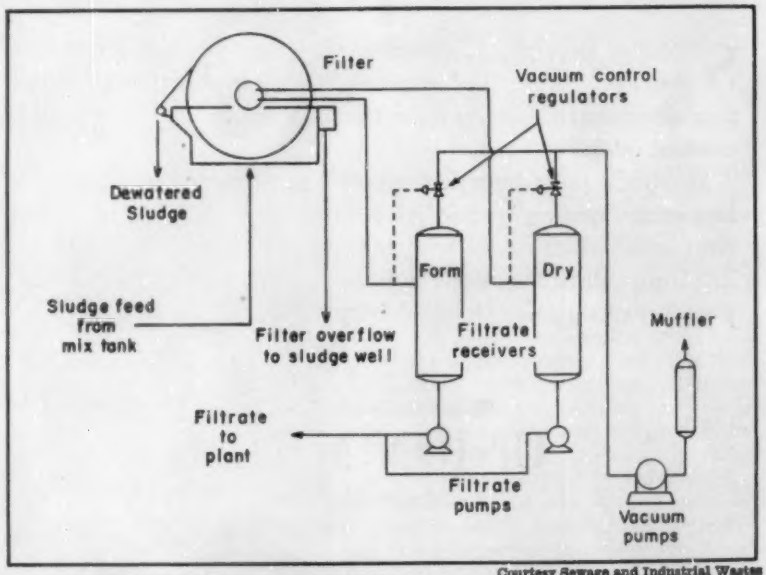
Colorimetric Determination Of Dissolved Oxygen

The authors describe a colorimetric modification of the Winkler method which, they say, reduces the time spent in analysis, eliminates the standardization of solutions, is easier and less tedious to use, and gives direct correlation with the standard method.

"A Colorimetric Method for Determining Dissolved Oxygen." By Charles S. Oulman and E. Robert Baumann, of Iowa State College Eng. Experiment Sta. *Sewage and Industrial Wastes*, December.

Effects of Synthetic Detergents on Filters

Experiments conducted by the authors in the University of Durham, Kings College, correlated with those of previous research workers, led them to the following general conclusions: (*a*) In the practical concentration range synthetic de-



Courtesy Sewage and Industrial Wastes

● **PIPING layout for filter vacuum system used for sludge filtration.**

IT LOOKS LIKE A SWANK CABANA CLUB, but this impressive establishment actually is the new sewage treatment plant at Coral Gables.

Beauty Comes to Sewage Treatment

Murals adorn the new sewage treatment plant on the main street of Coral Gables, Florida

How times change! Until recently, you would normally expect to find the sewage treatment plant on the wrong side of the tracks, hidden away in an isolated spot. Today, however, proper equipment positively controls odors, and attractive landscaping provides a pleasing appearance. As a result, cities can now build in the most practical location. And often a plant that's close-in saves miles of costly sewer installations.

Coral Gables selected its plant site on Ponce de Leon Boulevard, the city's main thoroughfare. A pleasant and attractive sewage treatment plant was constructed, and the digesters equipped with P.F.T. Floating Covers for efficient "controlled digestion". Then, with a burst of inspiration, the city commissioned a well-known artist to beautify the walls of the digestion tanks with historical murals. And so, in a state where nothing seems surprising, the sparkling new sewage treatment plant at Coral Gables has become a magnificent civic showplace!

continued next page

CLASSROOM FACILITIES in the main building enable students of sanitary engineering at the University of Miami to attend laboratory sessions at the plant.

"Operation Health and Beauty"

At present, the new Coral Gables plant will handle a design flow of 2.5 million gallons of sewage per day. It can be expanded to treat a total of 7.5 mgd. This modern plant includes P.F.T. "controlled digestion", and is an important forward step in Florida's outstanding program of pollution abatement.

The murals decorating the digestion tanks were painted by well-known artist John St. John. They are the first monumental historical murals in the U.S., and depict by authentic symbols eight epochs of Florida history: Florida of the Aborigines, the Discovery, Initial Struggle for Power, Spanish Colonialism, English Settlement, Early Years of Statehood, Development of the Southeast Coast Area, and Coral Gables.

Design of plant by: Smith and Gillespie, Consulting Engineers of Jacksonville, Florida.

Direction of overall sewer projects by: M. B. Garris, Consulting Engineer of Miami.

DESIGNS on the North Digester represent the last 150 years of Florida history, from the early years of statehood, on through development of the area, up to the present.

HISTORIC SYMBOLS on the South Tank portray the work, play and times of the native Indian, and the first 300 years of history following Florida's discovery.

tergents cause impaired filter performance by the strain thrown on the biological system by overloading it with material chiefly of a carbonaceous nature. A main criterion is, therefore, the loading of the plant. (*b*) Of the properties peculiar to synthetic detergents suppression of oxygen-transfer rates is likely to impair filtration. (*c*) With heavily loaded filters originally yielding first-class effluents, none of the major types of synthetic detergent found in British sewage is likely to cause a significant deterioration in performance, including nitrification, in concentrations much below about 20 p.p.m. (active agent). (*d*) It appears likely that the activated-sludge process is more sensitive to synthetic detergents and critical concentrations may be lower.

The number of British sewage plants already overloaded is surprisingly high. There is little doubt that small concentrations of detergent or other agent producing overloading will cause a marked deterioration in the performance of such plant. The carbonaceous overloading, therefore, caused by the synthetic detergents may well be their decisive property in the demonstrable deterioration that has followed their introduction.

"Effect of Synthetic Detergents on the Biological Stabilization of Sewage." By L. Barden and P. C. G. Isaac. *The Surveyor*, Nov. 17.

Analyzing Digester Gas

To examine any effect due to radioactive wastes in sludge, it was considered most expeditious to study the quality of the gas produced from parallel digesters with and without radioactivity. Therefore the development of a method for the continuous qualitative analysis of sludge gas was undertaken by the author during the latter part of 1955, and in January 1956 the chromatographic method of analysis or vapor fractometry was decided to be the most fruitful avenue of investigation. Gas chromatography is a method for the separation and measurement of the gaseous components from a mixture, obtained by passing the mixture in a stream of gas through a column. To date, they had prepared 28 different columns and studied their characteristics. Both partition and adsorption chromatography were employed, and present indications are that the latter will be most effective.

"Development of a Continuous Gas Chromatographic Analyzer for Sludge Digestion Studies." By

Werner N. Grune, James V. Carter, Jr. and J. Peter Keenan, of Georgia Inst. of Technology. *Sewage and Industrial Wastes,* December.

Lagoons for Raw Sewage

As of January 1, 1956, 100 sewage lagoons were in operation in the Missouri Basin states, by towns varying in population from 150 to more than 10,000. Of the older lagoons, 38 serve as secondary treatment facilities. It is found that single-chamber lagoons normally afford a degree of treatment comparable to that attained with very efficient conventional secondary treatment. BOD removals as high as 80% are obtained, though they may fall to 32% during winter conditions. Removals of coliform type bacteria averaged 95% during an entire operating season at Kearney, Nebraska, and daily removals were frequently as high as 99.9%. Total suspended solids of sewage origin are virtually eliminated. The surfactant portion of synthetic detergents is but slightly reduced; in many lagoons it lowers surface tension and prevents development of waves and ripples from wind action. Lagoons seem well suited to sparsely populated areas where land is available at a reasonable price. The Public Health Service plans studies to determine maximum permissible loading factors, and the practicability of their use by larger communities. Lagoons are apparently fulfilling a recognized need and appear to offer hope for early abatement of water pollution in many localities. In addition, they are making possible sanitary sewers in numerous areas where they were not previously feasible because of the high cost of conventional sewage treatment.

"Raw Sewage Lagoons." By Glen J. Hopkins and Joe K. Neel, of the U.S.P.H.S. *Water & Sewage Works,* December.

Sewage Force Main Improves With Age

A 42-inch cast-iron main about a mile long has been used by Baltimore for 43 years for pumping bar-screened sewage from the city. In 1927 a careful test of its capacity was made, which showed an n in Kutters formula of 0.0144 to 0.0139, and a c in the Williams-Hazen formula of 102 to 104. Other tests made in 1955 gave values of n 0.0116 to 0.0118, and values of c from 122 to 124. This showed a material reduction in friction, just the opposite of the experience with water mains. It is believed that this was due to higher velocities in the force main, which tended to reduce the thickness of the deposit of gelatinous coating on the interior of the pipe and consequently to increase the effective cross-sectional area of the pipe.

"A Sewage Force Main Improves With Age." By C. E. Keefer, Asst. Sewerage Eng. *Water & Sewage Works,* December.

Buoyancy of Aeration Tank Liquid

There is a more or less prevalent idea that air discharged into an aeration tank so reduces the specific gravity of the liquid that it will not float a man falling into it. To test this theory by a practical test, Activated Sludge Ltd. of England had three members of its staff jump into a newly constructed aeration tank containing sterilized well water while it was receiving air at rates ranging from 0.09 to 0.39 cfm of free air per sq. ft. of aeration surface. The men found no difficulty in swimming in the tank for 6 to 8

Walter T. Messeck, Supt. of Utilities at Tipp City, Ohio, sets Enterprise "Select-O-Matic" control for Dual Fuel operation.

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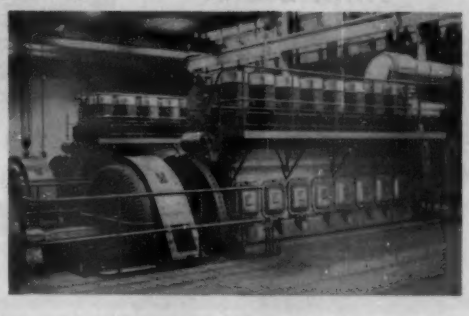

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minutes. It was believed that the buoyancy was provided by air trapped in or between the layers of clothing worn; and that the danger of drowning to one falling into an aerated tank would be less than if the contents were not aerated.

"That Aeration Tank Danger Seems to be a Myth." *Municipal Engineering*, Nov. 23.

Mechanical Flocculation Ineffective Without Chemicals

Experiments conducted in England were thought to indicate that mechanical flocculation of domestic sewage is of value only when used in conjunction with a coagulant. Also, sedimentation was found to be considerably influenced by the results of biological activity; a valuable degree of biological purification is therefore obtained by the detention of the sewage for a sufficient period. Chemical precipitation as an aid to settlement should not be attempted without a full knowledge of all the relevant factors; otherwise the settled liquor may be inferior to that produced by simple settlement alone. For removing chromium, aluminum sulfate was found to be the best precipitant; and this and lime removed about 90% of the phosphate content, but acid precipitation takes a small proportion into solution.

"Extra Detention Does Help Biological Filtration." By T. Stones, Sewage Works Mgr., Salford, England. *Municipal Engineering*, Nov. 23.

Other Articles

"Sewers in **Permafrost**" at Fairbanks, Alaska. By M. W. Slankard, City Mgr. American City, December.

"The Annual Conference of the (British) **Institute of Sewage Purification.**" Discussion of papers presented there. By John Finch, Mgr. of Sewage Disposal at Slough, England. Water & Sewage Works, December.

"Sewerage and Sewage Treatment in **New Zealand.**" Abstract from a report by R. C. Lough, Eng. Ministry of Works. Public Works, January.

"Charges for **Repairing Street Cuts.**" Practices in several hundred cities. Public Works, January.

"Designing a Sewage **Pumping Station.**" Procedure described and illustrated by a specific case. By J. R. Patterson. Public Works, January.

"The Health Department's Role in **New York Harbor Pollution Control.**" By Harold Romer, Dir., Bureau of San. Eng. Sewage and Industrial Wastes, December.

"**Pollution Survey Sampling** of New York Harbor." By Robert Shapiro, Chief of Laboratories. Sewage and Industrial Wastes, December.

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Construction Training Aids

(*Continued from page* 100)

sembled with the field pictures into the master filmstrip.

In the earlier filmstrips the critical need for training aids made it necessary to work in a somewhat improvised manner, by utilizing available pictures, and writing the script around them. Later filmstrips have been developed in the more direct and comprehensive manner of starting with a complete script. This process has utilized to the maximum extent the services of the men with best knowledge of the subject to achieve full coverage of the field. For example, in "Earthwork Operations" the preliminary outline was prepared in conference with experienced engineers representing both the northern and southern districts. This insured coverage of different types of projects and variety of terrain and construction conditions.

Later, in the detailed writing of the script there were, of course, many instances where changes, additions and deletions became necessary. Also review of partly com-

pleted portions showed "gaps" or entirely new areas of information to be considered. These revisions were handled without difficulty during the course of production.

All photographic work, including the production of filmstrip copies, is now performed by division personnel but disc records from division tape transcriptions are obtained under contract.

A 35mm. projector with filmstrip attachment and a record player with 33 1/3 rpm speed are standard equipment in all of the highway districts.

Most of the completed subjects consist of some 400 to 500 separate pictures, with two accompanying discs recorded on both sides. Each record side has a 20 to 25 minute playing time.

The films are viewed by the resident engineer's staff and sometimes by the contractor's supervisory personnel in advance of the project's reaching the particular stage covered by the filmstrip.

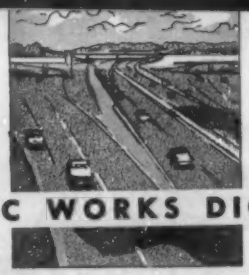
Knowledge of some elements can be gained only through actual working experience, but the speed with which the knowledge is gained can be increased materially by the use of these visual aids. The benefits of the construction films extend not only to construction personnel but to designers and people engaged in other functions.

This article has been slightly condensed from the excellent *California Highways and Public Works*.

• • •

Montana Air Force Station Desalts Brackish Water

The Seattle District, Corps of Engineers, has installed a demineralizing unit manufactured by Ionics, Incorporated, of Cambridge, Mass., to provide palatable drinking water for personnel. The station is served from deep wells which produce water of high alkalinity and containing about 1800 ppm of dissolved solids, principally salt and sodium bicarbonate. The Ionics system provides a means of passing impurities through a series of thin, water-tight, electrified membranes, which attract dissolved ionic components and permit the accumulation of demineralized water. The station demineralizer plant costs about $20,000, and on 24-hour operation, it can produce 9,000 gallons of water daily using about 70 kwh per day. The largest single plant of this kind is an 86,400 gpd unit being installed by the Bahrain Petroleum Co. on Bahrain Island in the Persian Gulf.



PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Measuring Shape and Texture of Sand

There has been no satisfactory laboratory test for evaluating sands with respect to angularity and texture. Microscopic examination is possible but time-consuming and depends on visual observation. Recently a simple, direct test was developed in the laboratories of the Bureau of Public Roads, based upon the principle that smooth textured, rounded sand particles offer less resistance to free flow than do rough textured angular particles. It is believed that this test will be of value in laboratory studies of bituminous mixtures and in evaluating the surface characteristics of sands in the field with respect to specified requirements. The equipment is simple, the operation is practically free from personal element, and the results obtained by different operators are highly reproducible.

In making this test, a specified amount of one-size sand is allowed to flow freely through a standard orifice and the rate, in the term of seconds per 100 cubic centimeters, is determined. This rate of flow compared with that of Ottawa sand of the same size is taken as a measure of the relative angularity and surface roughness of the sand.

"A Laboratory Test to Evaluate the Shape and Surface Texture of Fine Aggregate Particles." By Harry M. Rex and Robert A. Peck, Research Engineers of Bureau of Public Roads. *Public Roads*, December.

Mechanization For Highway Maintenance

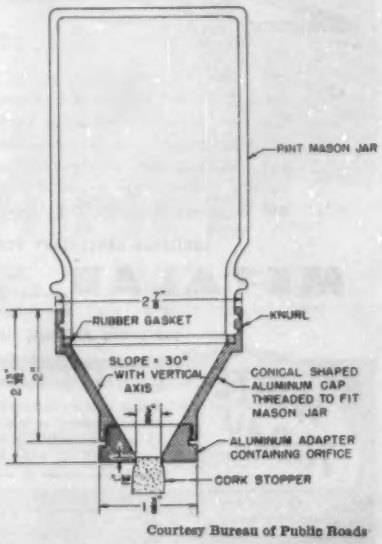
The tremendous task of maintaining nearly 3 million miles of county and local roads in this country is an essential prerequisite to a healthy national economy. Careful planning for mechanization is required if the full benefits are obtained. Planning might be divided into four major segments as follows: (1) Selection of balanced equipment fleets; (2) organization for mechanized maintenance; (3) managerial control over maintenance equipment; and (4) care of maintenance equipment. The number of miles of roads will affect the quantity of equipment needed. Striking contrasts are found in comparing the equipment used for maintaining rural roads with that used in urban areas. Characteristics of a system of roads have a decided effect upon the equipment needs. Currently, the most serious problem faced by maintenance engineers arises from the amount of deficiencies in the roads to be maintained.

"Mechanizing for 3,000,000 Miles of Highway Maintenance." By H. A. Radzikowski, Chief, Maintenance Branch, Bureau of Public Roads. January, PUBLIC WORKS.

Geology in Highway Design

The Kansas Highway Commission, by making systematic use of geologic data, prepares better and more economic road design and secures closer and more accurate bidding by contractors. One of the contributions of geologists is providing a technical definition of rock excavation based, not on the necessity for blasting, but on geologic type and condition, which are ascertained without uncovering the rock. When a center line for a proposed road has been located approximately, the geologist determines underground conditions for distances as great as 20 miles on each side of it; these including seepage conditions, weathering characteristics, erodability, slope stability, jointing and all other physical characteristics of engineering significance. With knowledge so acquired, soundings are necessary only to check at occasional locations. The geologic information is used in determination of the location of the center line, and the most economical grade and cross-section; in estimating the shrinkage and swelling of excavated materials; in classifying the excavated material for pay purposes; in fill foundation treatment; in controlling subgrade moisture; in selecting stable backslopes; and in designing surface drainage. In the case of bridge planning, the geologist helps select the location and type of piers, gives information on probable stream stability, scour, etc.

"Geology in Highway Design and Construction." *Roads and Streets*, December.



Courtesy Bureau of Public Roads

● **CROSS-sectional view of apparatus for testing sand shapes and textures.**

The AASHO Test Road

So-called because it is sponsored by the Am. Ass'n of State Highway Officials, is a $14,000,000 highway research project being financed cooperatively by the state highway departments, Bureau of Public Roads, Dept. of Defense, Automobile M'frs. Ass'n. and others. It is being conducted by the Highway Research Board and site preparation is already under way near Ottawa, Ill., on U.S. 6. The test section extends from Ottawa to Utica. There will be 836 individual test sections. Half of the test pavement will be of concrete, both reinforced and non-reinforced; the other half will be of asphaltic concrete. The project also includes 16 test bridges, 8 of steel girder construction, 4 of conventional concrete and 4 of prestressed concrete. The test vehicles will consist

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of truck-tractor semi-trailers and smaller two-axle vehicles, providing loads of 2,000 to 48,000 lb., driven at approximately 30 mph. The portland cement concrete slabs will be from 2½ to 12½ in. thick, most of them on a granular subbase ranging from 3 to 9 in. thick. The asphaltic surfaces will range from 1 to 6 in. thick, laid on base and subbase with thicknesses ranging from zero to 25 in.

"Large-Scale Highway Research —AASHO Road Test." By Fred Burggraf, Director, Highway Research Board; and W. B. McKendrick, Jr., Project Director. *Civil Engineering*, December.

Compaction Of Soils

In designing and constructing any project requiring soil compaction, such as a highway or dam, there is a tendency to require as much compaction as possible. This may be more than is really needed, and therefore uneconomical. The compaction techniques for any given case should be influenced by 1) Construction specifications; 2) Type of soil to be compacted; 3) Soil moisture content during compaction; 4) Depth of soil layers; 5) Type of compaction equipment; 6) Number of passes made by the compacting equipment; 7) Embankment foundation conditions. The selection of compaction equipment is an economic decision that can best be made by a consideration of fundamental compaction principles. Each project should be examined for the interrelationship between types of equipment, layer depth, number of passes, and soil moisture requirements. Test fills represent an excellent technique for determining these interrelations.

"Factors Influencing the Choice of Compaction Equipment." By Robert F. Baker, Assoc. Prof. of Civil Eng., Ohio State Univ. PUBLIC WORKS, January.

Diluted Emulsions For Flexible Base

The Texas Highway Department is using diluted emulsions for processing and finishing flexible base courses. A diluted emulsion is a mixture of emulsified asphalt and plain water. Percentage-wise the mixture normally consists of from 2 to 10 percent of emulsified asphalt and 98 to 90 percent of water by volume. Basically, diluted emulsion in processing flexible bases results in a twofold benefit: (1) as a dust palliative to minimize the discomfort to traffic and neighboring property owners which is an important factor, considering that a large volume of work must be done "under the wheels" of traffic; and (2) as a holding factor in connection with the finished base surface. When the treatment is used in conjunction with the laying-in operation, application should be made immediately ahead of the blade roll. On sealing operations the emulsion should be applied in half-widths and allowed to dry before traffic is routed over it. The drying time varies from 30 minutes to a couple of hours depending on weather conditions and condition of the base.

"Diluted Emulsions For Flexible Base." By Thomas K. Wood, Senior Resident Engineer, Texas Highway Dept. *Roads and Streets*, December.

The Use of Radio on the Ohio Turnpike

A vital factor in the Ohio Turnpike's achievement is its ultramodern radio-communications system. The usefulness of the system has been proved in the essential tasks of policing and of dispatching service trucks to stranded motorists and maintenance trucks to icy sections. Instant communication is available from the turnpike headquarters at Berea to the Ohio State Highway Patrol, service trucks, toll plazas, maintenance buildings and vehicles and commission staff cars. The backbone of the system is a seven-hop, 2000-mc. microwave link. Micro-wave towers, averaging 250 ft. in height, relay messages between successive stations. Five channels are used to meet the various needs of the commission.

"Nearly Impossible to Get Along Without Radio on Ohio Turnpike." By R. S. Deetz, Ohio Turnpike Project Engineer. *Better Roads*, December.

One Hundred and Fifty Years of Accuracy

The present plan of the Coast and Geodetic Survey of the United States Department of Commerce is to cover the entire nation with a network of triangulation stations spaced at least 7½ miles apart to provide at least one station for every 50 square miles of area; and to have permanent points at 1 to 2-mile intervals in metropolitan areas and along major highways; and at 3 to 4-mile intervals in rural areas of high land value. Over a period of 150 years the USGS has met the ever-increasing demands for horizontal and vertical control for map-

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ping, land surveys, engineering and scientific pursuits. These vital services in the field of geodesy place in the hands of the surveyor and engineer a valuable tool which adds greatly to the scope and accuracy of land surveying and engineering enterprises.

"One Hundred and Fifty Years of Accuracy." By Rear Admiral H. Arnold Karo, Director, U.S. Coast and Geodetic Survey. PUBLIC WORKS, January.

Engineering in Rural Counties

It is essential that rural counties have an adequate engineering service. In the construction and maintenance of county highways there is a great need for good engineering departments. County Governments are becoming more complex each year and they need qualified engineers to study and analyze the economic changes and make recommendations for future planning and development. One of the greatest advantages of having qualified supervision is to develop a long-range highway improvement program so that a definite number of years' work is always under consideration.

"Engineering in Rural Counties." By George Deibler, St. Louis County Engineer, Duluth, Minn. PUBLIC WORKS, January.

Other Articles

"Diluted Emulsions for Flexible Base," as used on Texas Highways. By Thomas K. Wood, resident engineer. Roads and Streets, December.

"Precast Concrete Pedestrian Bridges Built Over Expressways" in Houston, Tex. By Ardis White, and William B. Purnell, Assoc. Profs., Univ. of Houston. Public Works, January.

"Mechanizing for 3,000,000 Miles of Highway Maintenance" necessary for economy. Estimates of the kinds of equipment and numbers of units per 1,000 miles of road maintained, for different classes of county roads and city streets. By H. A. Radzikowski, of Bureau of Public Roads. Public Works, January.

"Colorado Knows Value of **Personnel Training.**" By John F. DeVivier, Personnel Director. Better Roads, December.

"Nearly Impossible to Get Along Without **Radio on Ohio Turnpike.**" By R. S. Deetz, Proj. Eng. Better Roads, December.

"Highway Planning for the **Small Town:** Hold Up a Mirror." By Jacob Mende. Public Works, January.

"Traffic and Travel Trends, 1955." A large amount of travel data from main rural roads in all the states, and vehicle weights from 44 states, tabulated and analyzed by the Bureau of Public Roads. By Thomas B. Dimmick. Public Roads, December.

"How to Improve More Mileage on a Fixed Budget," using calcium chloride. By F. R. Sproule, of Wyandotte Chemicals Corp. Public Works, January.

"Engineering in **Rural Counties."** By George Deibler, Co. Eng., St. Louis Co., Minn. Public Works, January.

"Poor **Backfill Tamping** Often Means Double-Cost Construction." By Edward F. Taylor, Pres., Gunderson-Taylor Machinery Co. Roads and Streets December.

"Application of Industrial Engineering Techniques." Part 5 of a series on **"Construction Management."** By Geo. E. Deatherage. Roads and Streets, December.

"Kentucky Builds Long Continuous Concrete **Box Girder Bridge."** By E. D. Smith, of Ky. Dept. of Highways. Roads and Streets, December.

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Philadelphia Food Center

(*Continued from page* 107)

and the Chairman of Council's Committees on Finance, Streets and Commerce.

The Food Center contract was sent to City Council and promptly approved and the Redevelopment Authority began acquiring land in the area.

While awaiting approval of condemnation proceedings on most of the land required, the Redevelopment Authority entered into a contract with Albright and Friel, Philadelphia engineers, to determine the best means of filling the site. The Department of Streets has retained Modjeski and Masters, another Philadelphia firm of engineers, to do the necessary topographical mapping and soil analysis. The Water Department is preparing plans for changes in the water and sewerage facilities in the area which are estimated to cost $5,261,000 eventually.

Exclusive of the area to be devoted to streets, the Food Distribution Center will comprise approximately 310 acres of developable land. Present indications are that at least 110 acres of this tract will be covered by buildings, and that this acreage will provide approximately 6,000,000 square feet of floor space.

The first area to be developed is a tract of approximately 100 acres which will afford space for the fruit and vegetable market and may also provide for seafood and poultry in an area of approximately 35 acres north of Pattison Avenue. The remaining acreage of this stage one

development area, located south of Pattison Avenue, will be offered in individual parcels to meet the needs of larger food processors and wholesalers. Site preparation schedules for the stage one area have been agreed upon by the various City agencies, indicating completion of the sanitation and street improvements work by October 1958 at the latest. In the meantime, the Food Distribution Center is negotiating with potential lessees or purchasers of parcels in this area, and building construction is expected to begin by September 1957, with initial occupancy scheduled for the late summer or fall of 1958. The scheduling of the stage two development will be dependent on further demand for space and can be undertaken during 1957 if sufficient interest on the part of the wholesalers exists.

As originally envisaged, each commodity classification of food distribution would have been located in a separate sector of the Center. The need for developing the Center in stages, consisting of approximately 100 acres each, will require some adjustment in the plan as the various wholesalers move in. The need to provide for future expansion will also mean that no area of the Center will be developed to maximum use during the three stages presently contemplated.

Construction loans will finance the stage one development plan, backed by pledges of mortgage financing on each property developed. The pledges will be in turn backed by terms of a lease with sufficient revenue return to meet amortization and other costs. As the Center itself develops sufficient operating experience to indicate its earning capacity, future developments may be financed by tax-exempt bonds if such financing seems more economical.

As each piece of property is transferred by the Redevelopment Authority to the Corporation, it will be placed on the local tax rolls. When fully completed, it is anticipated that the project will pay to the City property taxes of over a million dollars per year, and more than $800,000 to the Philadelphia School District.

In addition, the Corporation will pay the City five percent of its gross rentals from tenants, after meeting its other liabilities. By terms of the contract, the assets of the Food Distribution Center may be transferred to the City after all obligations have been paid, or at the expiration of 50 years. Such transfer would not, of course, include sites within the project area which had previously been disposed of by sale. The City Controller is, under terms of the agreement, authorized in the meantime to audit the food center's books.

In addition to the cost of the land and the fill, the principal cost items to the City are in the provision of water lines, sewerage and streets. But, as was indicated in the public hearings on the project, these are services the City provides normally in every section being developed. It is noteworthy that, because of the proposed use of the area, about one-fourth as many lineal feet of streets will be required as are ordinarily provided for residential or commercial development according to the gridiron pattern prevalent in the neighborhood. The total cost of new public streets is estimated at $4,138,000.

It is recognized that the new Center will require a large water supply, and engineers are currently preparing plans for the necessary lines, based on data developed by the U. S. Department of Agriculture. Since Philadelphia's water supply is drawn from two major rivers, the Delaware and the Schuylkill, volume is not an immediate problem.

The new Southeast Sewage Treatment Works is close at hand, and plans for the necessary sewer connections are being worked out with the Water Department.

The problem of refuse disposal for the new Center is not yet solved; it is probable that either the individual wholesalers or the Center will be required to assume this responsibility, although actual incineration may be in the nearby City facility.

Equally important with the financial advantages the plan offers the City are the incidental benefits. Since the new project is located adjacent to major highways, its opening will take a number of heavy trucks off mid-city streets—trucks which now complicate the traffic problem while going to and from the Dock Street market. The Dock Street area will be vacated, making possible a major redevelopment of this tract. The unsightly dumps now covering most of the South Philadelphia site will be eliminated and a tax return will be realized from the waste land. An estimated 6,000 persons will be employed at the new facility. Finally, and possibly most important of all, from the City's long-range point of view, the relocated market, with new and attractive facilities, stands an excellent chance of enticing new food wholesalers and processors and obviates the danger of large-scale movement of the dealers elsewhere.

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Who Pays For Street Openings

The Editors of PUBLIC WORKS have tabulated the answers to questions asked about street openings on the 1956 water questionnaire. On the question who repairs the pavement: 328 said the street department; 254, the water department; 268, the city; 69, by other means. There were 427 cities that have the street opening charge made against the water department and 355 do not. On the charges made for the openings 115 charge the actual cost, 172 fixed fees and 65 charge by other means.

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Pneumatic Control System for Durango Water Plant

A new water treatment plant has been completed recently by Durango, Colo. Capacity is 9 mgd but presently it is being operated at 5 mgd. There are four sand filters which are equipped with pneumatic controls. The filtered water will be chlorinated and fluoridated.

PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Gamma Ray Disinfection

Experiments were conducted at Oak Ridge National Laboratory in January, 1956, on the destruction of microorganisms in water, sewage, and sewage sludge by ionizing radiations. These showed that it is possible to kill or inactivate such organisms by gamma irradiation. With the exception of *Bacillus subtilis*, kills up to 90% were achieved with dosages no larger than 7×10^4 rad. For a 99% kill the dosage was about 1.5×10^5 rad. The dosage required for complete kill in settled sewage and sewage sludge were 5.0×10^6 rad. for *B. subtilis*, and 2.0×10^6 for *Esch. coli*.

"Destruction of Microorganisms in Water, Sewage and Sewage Sludge by Ionizing Radiations." By Harry N. Lowe, Jr., William J. Lacy, Bernard F. Surkiewicz, and Robert F. Jaeger, of the U. S. Army Chemical Corps. *Jour., AWW Ass'n*, November.

Universal Metering In Philadelphia, Pa.

In 1952, of more than 500,000 active water services in Philadelphia, about 320,000 were metered. That year it was decided to meter the remaining 180,000, which were all in residences built before 1918. Horns and yokes were installed by contract, using special types designed for compression couplings which could thus be installed without threading the existing old piping, permitting rapid work. A temporary spacer pipe was inserted in the horn, to serve until the meter was installed, which was done by department employees. By May, 1956, more than 100,000 meters had been placed, and it was contemplated that the entire city would be metered by Jan. 1, 1957.

During 1952 there were in service more than 30,000 meters which were known to be in bad order, and 5,000 more in the meter shop awaiting repair. Late that year the meter shop was completely reorganized, new equipment was purchased, the employees were placed on an incentive pay plan, and a standard procedure adopted. After being disassembled at a breakdown bench, the meter parts are washed and the parts for each meter put in a separate pan and kept together until reassembled. They are then dipped in an acid solution and rinsed in an alkali one. The parts are then inspected and any unsuitable for reuse are replaced by new ones from stock. Then a repairman assembles the parts in each pan into a meter and gives it a quick water and air test, which is followed by an accuracy test, where special devices permit two men to test eight lines of meters at a time. The whole procedure is on a production line basis, the meters moving from one step to another on a gravity conveyor. More than 1400 meters a week pass through the shop, with the same number of employees that used to service 400 a week. The men receive a base pay plus an additional amount if they exceed a standard number of meters per day.

"Universal Metering and Meter Repair at Philadelphia." By Gerald E. Arnold, Gen. Supt. *Jour., AWW Ass'n*, October.

Reducing Evaporation From Reservoirs

Studies have indicated that net evaporation from surfaces of reservoirs in Texas varies from 12 in. annually in the extreme eastern part to 108 in. in the western. Fort Worth, whose water supply is impounded in three reservoirs having a combined area of 25,800 acres, is endeavoring to reduce the evaporation loss by reducing the surface area, 500 acres of very shallow water being eliminated from one reservoir by the construction of levees. In addition to evaporation, this also eliminates loss by transpiration through the plants that grow abundantly in this shallow water. The loss from these 500 acres is estimated to be 2500 acre-feet annually, the value of which would seem to justify economically the expenditure of the $10,000 which this work is costing.

The Southwest Research Institute has been investigating the possibility of reducing evaporation from reservoirs by covering the surface with a microscopic film of one of the fatty acids, as is being done in Australia and Africa. Also the Bureau of Reclamation and the water department of Oklahoma City are making a full-scale test on a lake which is part of that city's water supply; and the subject is being investigated by the Taft Engineering Research Center and the U. S. Geological Survey. Some 135 different chemicals have been tested in the laboratory and the results verify the Australian finding that hexadecanol offers the best possibilities as a film-forming agent. It is estimated that, with this chemical costing 30 to 40 cents a pound and a reduction of 30% in evaporative loss, the cost of the water saved would be about $1.60 per acre-foot. It has been established that such a film may reduce the evaporation by as much as 43%. Difficulties have been experienced in applying the chemical and forming and maintaining a suitable film over large surfaces exposed to wind and wave action.

"Evaporation Losses and Control." By Uel Stephens, Dir., Fort Worth Water Dept. PUBLIC WORKS, January.

Requirements of Domestic Water Devices

With the increasing use of new domestic water devices, such as automatic clothes washers and dish washers, garbage disposal units, and air conditioning equipment, domestic demand rates are much higher than they were a few years ago, calling for greater capacities in service lines and meters. Clothes washers use water at rates of 3 to 7 gpm; dish washers at rates of 2.5 to 5 gpm; and garbage disposals at 1.5 to 2.5 gpm. Water-cooled domestic air conditioners demand 6 to 20 gpm. Underground lawn sprinkling systems are now coming into use. It seems reasonable to assume that the

OUT THEY GO!

and IN go EDDY HYDRANTS

Many of the 650 fire hydrants in Maywood, Illinois (pop. 30,000), have been in service 40 years or longer. Some were no longer being manufactured, and repair parts were unavailable. In a decision to modernize its hydrants, Maywood decided to standardize on Eddy hydrants in 1954—to simplify servicing, cut maintenance costs, reduce parts inventory, and assure service for the future.

Eddy hydrants had proved highly satisfactory in Maywood's 50-mile system, and repair parts have always been available. Under the aggressive direction of public works director Bazel E. Crowe, above left, the replacement program, has proceeded at a fast, economical rate, with more than 170 hydrants replaced in 1956 alone.

it's the safest, most economical course!

EDDY
AWWA (UNDERGROUND) VALVES

Everything in AWWA valves for underground use in your waterworks system is quickly available from Eddy—gate valves; cutting-in valves and sleeves; tapping valves and sleeves. And, remember, Eddy's more than 100 years' dependable operation is your assurance of service far into the future.

Maywood feels that it cannot risk hydrant failure, nor afford the sky-high cost of handmaking individual repair parts for obsolete, "orphan" fire hydrants. Can you?

Based on the experience of this and other alert communities, your city or village might do well to take stock of its hydrant situation. If so, an EDDY man will be very glad to give facts and figures you will find most helpful in making a wise decision. Won't you invite him to see you . . . soon?

AWWA EDDY BRONZE-MOUNTED HYDRANTS

EDDY Bronze-Mounted HYDRANTS open smoothly with the pressure and close without water hammer. One man can easily remove all operating mechanism for inspection and repair. Positive drip action automatically drains the standpipe, safeguarding against freeze-ups. Stem held in place below hydrant valve means that there is no water loss due to a bent stem.

EDDY VALVE COMPANY
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WATERFORD NEW YORK

8 gpm demand formerly considered as maximum might be increased to 15 gpm or more, or even 25 gpm to provide for air conditioners; and that the ¾-in. service pipe generally considered as standard be increased to 1 in. or larger.

"Service Line and Meter Requirements of Domestic Water-connected Devices." By James G. Carns, Jr., of Am. W. W. Service Co. *Jour., AWW Ass'n*, October.

Troubles Due to Interference Organisms

The authors discuss problems in water treatment due in whole or in part to various aquatic plants and animals, such as tastes and odors; short filter runs; the presence in the distribution system of growths, worms, midges; clogging of meter screens; and various adverse effects on almost all phases of treatment. For treatment of pond weeds and plankton in reservoirs, copper sulfate is not always effective. Chlorination has been found to control organisms under many conditions without accompanying taste problems. Copper and chlorine used together as an algicide are more effective than either alone. At Philadelphia, chlorine dioxide was found to kill all plants by oxidizing the chlorophyll, and to render tasteless and odorless the essential oils produced by the algae. The cost of this treatment was high, but the superior effect was considered to be worth the additional cost. At Chicago, microstraining has been used to remove 82% of the plankton.

"Algae and Other Interference Organisms in Indiana Water Supplies." By C. Mervin Palmer and H. Wallace Poston, of the Robert A. Taft San. Eng. Center. *Jour., AWW Ass'n*, October.

Other Articles

"An Engineering Approach to **Water Treatment.**" By H. L. Thackwell. Public Works, January.

"**Radioactivity** and the Water Industry." A general discussion. By Arthur W. Kenny. Water & Water Engineering, November.

"Plant Facilities and Human Factors in **Taste and Odor Control.**" By Morris B. Ettinger and Francis M. Middleton, of the Robert A. Taft San. Eng. Center. Jour., AWW Ass'n, October.

"Report on Toxicity Studies of **Cadmium and Chromium.** By Clarence F. Decker, C. A. Hoppert and R. U. Byerrum, of Michigan State Univ. Jour., AWW Ass'n, October.

"Relations of Treatment Methods to Limits for **Coliform Organisms** in Raw Waters." By Graham Waters, San. Eng., Robert A. Taft San. Eng. Center. Jour., AWW Ass'n, October.

"**In Service Training** Program of the Philadelphia Suburban Water Company." By George H. Dann and Kenneth E. Shrell, of that company. Jour., AWW Ass'n, October.

"Trends in **Residential Water Use.**" Can best be expressed on the basis of sales per service connection. By Ross Hanson and Herbert E. Hudson, Jr., of Ill. State Water Survey. Jour., AWW Ass'n, November.

"Measurement of Low-Level **Radioactivity in Water.**" A progress report. By Lloyd R. Setter and Abraham S. Goldin, of the Robert A. Taft San. Eng. Center. Jour., AWW Ass'n, November.

"Application of Air Photo Interpretation in the **Location of Ground Water.**" By Robert H. L. Howe, Proj. Eng., and Harvey R. Wilke and Don E. Bloodgood of Purdue Univ. Jour., AWW Ass'n November.

"Use of **Molecular Filter** Membranes for Water Potability Control" would be a signal advance in sanitary engineering practice. By Harold A. Thomas, Jr. of Harvard Univ., and Richard L. Woodward and Paul W. Kabler, of the Robert A. Taft San. Eng. Center. Jour., AWW Ass'n, November.

"Considerations in **Recreational Use** of Impounding Reservoirs." Arguments for and against, by six superintendents and engineers. Jour., AWW Ass'n, November.

"**Maintenance** and Inspection Methods for Valves and Hydrants." By R. L. Lawrence, Supt., Alexandria, La. Jour., AWW Ass'n, November.

"1400 Cities and Towns Serve Over 30,000,000 with **Fluoridated Water.**" Water Works Engineering, December.

"How to **Reduce Operating Costs** at Water Treatment Plants." Experiences at Shreveport, La., by A. A. Hirsch, Supt. and at Lafayette, La. by J. L. Love, Supt. Water & Sewage Works, December.

• • •

Water System for Cartagena, Colombia

Rader and Associates, Miami, Florida, engineering and architectural firm, has been awarded a contract to plan and design a complete water system for Cartagena, Colombia, and six nearby towns, which may approximate 10 million dollars, senior partner Earle M. Rader announced.

The proposed water system, which is to include a complete water treatment plant, a pumping station, and a 30-mile long supply aqueduct as part of an extensive distribution system, will be designed to meet the future needs of the Cartagena area.

Empreses Publicas, the utilities commission of Cartagena, which awarded the contract to Rader, also allocated a second contract to the Miami firm to revise existing plans of the proposed sewer system.

Part of the skyline at FARGO, NORTH DAKOTA

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Integral elements in Fargo's general plan for improved city water pressure and fire protection service are these modern Pittsburgh-Des Moines elevated steel tanks.

At top is shown the newly-erected PDM 1,000,000-gallon radial cone tank, built across town from the pumping station, supplying both a residential area and North Dakota Agricultural College. Below is pictured the PDM 500,000-gallon double-ellipsoidal tank built in 1952, located in the business district for always-available fire protection. (The privately-owned roof-top industrial tank is also by PDM!)

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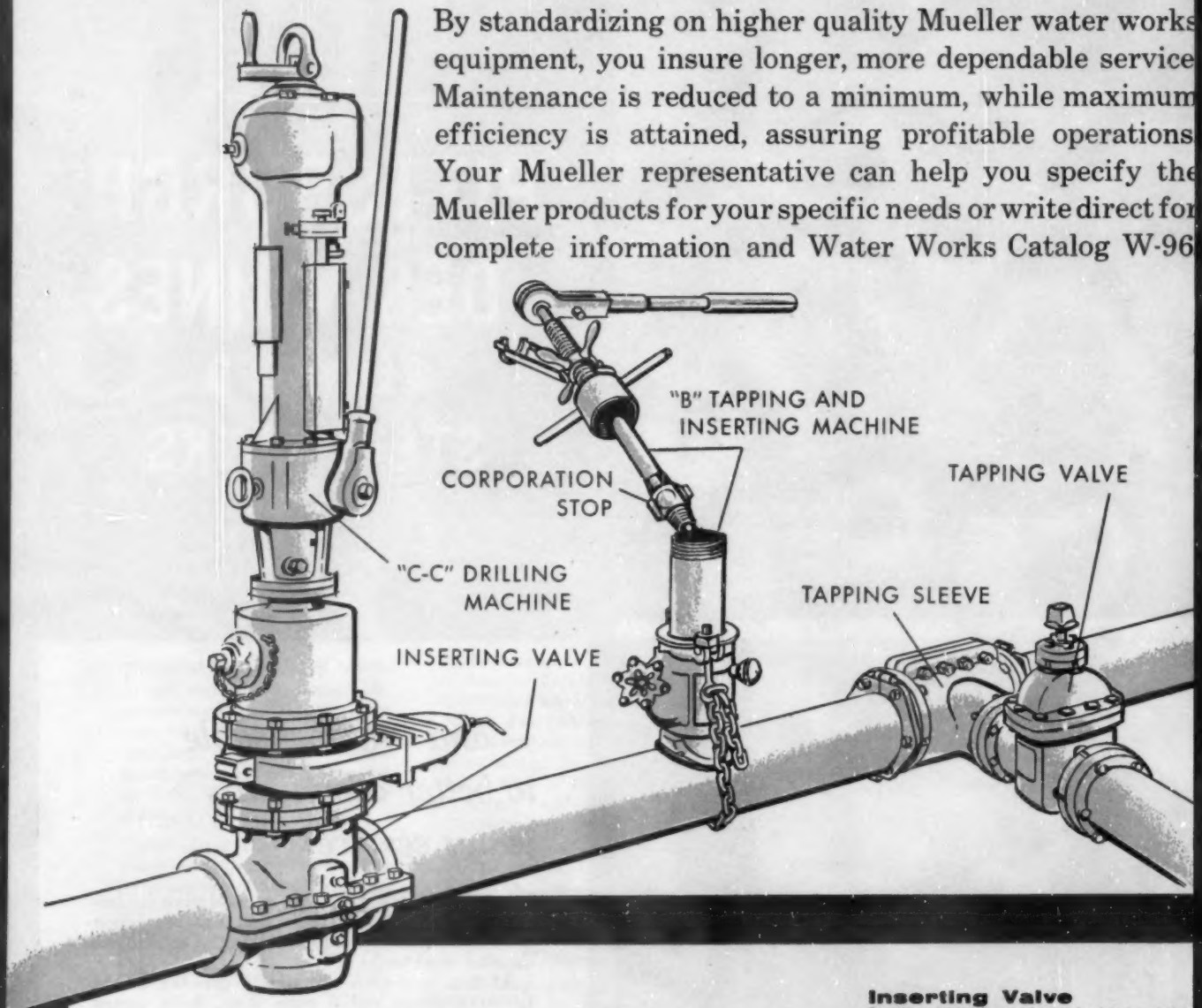

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Provides additional control at vital points in existing lines. Installed, under pressure, without interrupting service or losing water. Operates like a regular Mueller Gate Valve, with easy operation and positive shut-off. Parts are interchangeable with Mueller Gate Valves. For 4", 6" or 8" lines.

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Hand operated. Makes 2" to 12" cuts in any size main, dry or under pressure to 500 p.s.i. 25" boring bar travel. Automatic feed for drilling; hand feed for rapid advance. Power operated C-1 machine with air or gasoline engine power units available. Feed indicator standard on both C-C and C-1 machines.

"B" Tapping and Inserting Machine Drills and taps mains and inserts ½" through 1" corporation stops in mains under pressures to 90 p.s.i. May be used on pressures to 230 p.s.i. with power clevis. Combined relief and by-pass valve permits easy operation of the flop valve.

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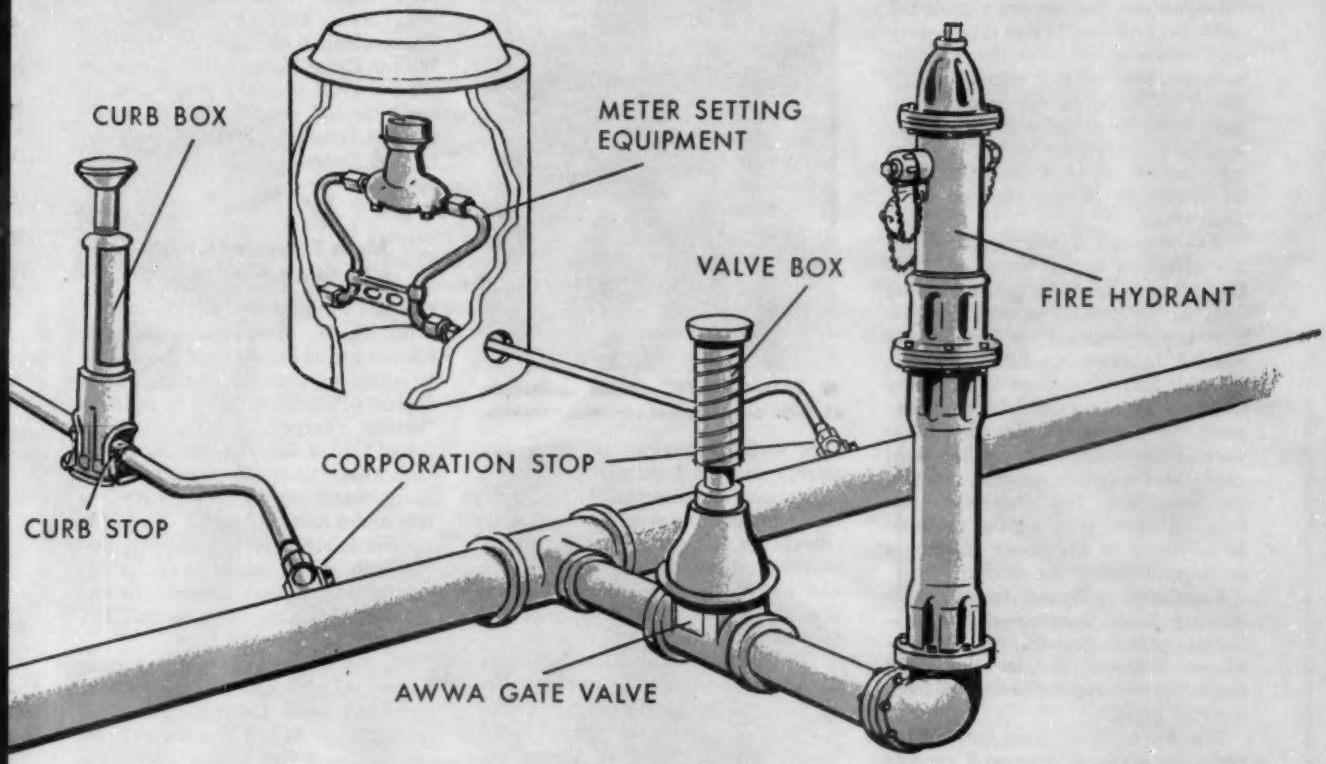

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Corporation Stop
Can be installed in lines under pressure. Keys and bodies are of finest water works bronze, precision machined, individually ground and lapped. Accurately machined threads assure water tight connections. Inspected and tested under pressure. Sizes ½" through 2" with a variety of inlets and outlets.

Tapping Sleeve
Used with a tapping valve – connects lateral or branch main under pressure, without shutdown or loss of water. Heavy construction adds strength and rigidity at the connection. Nominal size fits all classes of cast iron pipe by using either of two sets of gaskets. Sizes 3" through 48".

Tapping Valve
Oversize waterway allows full-size cut and maximum flow. Exclusive four-point disc wedging mechanism produces tight shut-off and trouble-free operation. With "O" ring stem seal or conventional packing. Sizes 2" through 16". Hub or mechanical joint type ends.

Valve Box
Two or three piece – sliding or screw types for valves 3" and larger. 5¼" shaft. Valve box adapters and extension pieces for both types. Also available, 4¼" shaft, roadway screw type for 3" and smaller valves.

AWWA Gate Valves
Exclusive four-point wedging mechanism distributes seating pressure equally to four points near outer edge of disc. Shut-offs are fast, easy, positive. Permanently lubricated stem thrust collar for reduced maintenance on "O" ring type valves. Stem seals are "O" ring or conventional packing. Rising or non-rising stem.

Curb Stop
Ground key is individually lapped, precision fitted into body of cast water works bronze. Steep key taper gives ease of operation, long life, positive pressure tightness. Cap and tee on inverted key type has accurate built-in check. Sizes ½" through 2". Inverted key or solid head type.

Curb Box
Telescoping section prevents damage to box, stop or service line. Phosphor bronze spring holds upper section in place while back-filling. Lid is bronze-bushed for easy removal of access plug. Rigid support given by arch-type base. Coated with protective tar-base enamel. For stops ½" through 2".

Fire Hydrant
Dry top design with "O" ring stem seals keeps moisture away from operating threads. Lubricating reservoir gives positive lubrication each time hydrant is operated. Safety flange and stem coupling limits traffic damage to small inexpensive parts – hydrant barrel and stem are re-used. Compression-type main valve. Double drain valves force flushed each time hydrant is operated.

Meter Setting Equipment
Copper meter yoke with multi-purpose connectors... relocation yokes...iron meter yokes...plain or lock-wing angle stops...meter couplings...each with a variety of inlets and outlets.

ROBOT COLLECTORS HANDLE TOLLS

WITH THE AID of a newly-developed, pint-sized console, Toll-O-Matic, the almost-human toll collector, now boasts that it can carry on a two-way conversation with the motorist, take money, squeal on the driver if he does not deposit the right number of coins in its hungry mouth, and transmit remotely visual information of each transaction to an electronic gadget manned by a supervisor.

The supervisor can keep tab on the activities of one or more Toll-O-Matics, watching a pair of rolling eyes on the console panel that show the exact amount of coins deposited in each machine's hopper. Should there be even one penny short, or should a motorist tarry beyond the ten-second limit set for a normal transaction, an amber light glows and a buzzer sounds, alerting the attendant. The supervisor can then speak directly to the motorist to advise him of money shortages or inquire about the delay.

Familiarly referred to as "Miss Hungry Lips" because of her outthrust rubber mouth, the Toll-O-Matic collector is just the right height to receive coins tossed from moving cars.

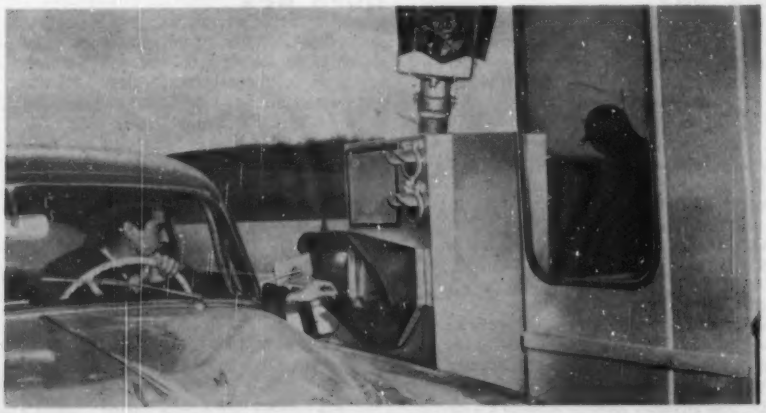
The motorist, without leaving his car, can ask questions and receive clear, audible answers. Transcribed messages can also be repeated at regular intervals (as often as every five seconds) by means of tape recordings. These may be used for giving official announcements about weather and traffic conditions, road information or a simple "Thank you, proceed".

Other features incorporated in Toll-O-Matic include a trip-lock device that accepts only one toll at a time. Should anyone toss the wrong amount in the hopper or attempt to pass without paying, peace is instantly shattered with a flash of red lights, and an automatic alarm bell. If the car continues to move, its own wheels set off an automatic camera, which photographs the license plate and simultaneously records on the film the time, date and place of the offense.

● **TOLL-O-MATIC speeds collections of tolls on turnpikes, bridges, tunnels.**

The money deposited by each driver is temporarily stored in a visible, glass-windowed compartment in the body of the Toll-O-Matic fixture, so that the coins themselves can be visually checked if any question arises about the amount given. These coins are released to the vault below only after the transaction has been cleared and the next fare accepted.

The coin-checking mechanism can be reset readily to receive any combination of nickels, dimes or quarters. It can thus accommodate any changes in toll charges which may be desired from time to time, during special hours of the day or night, or during particular seasons.



● **COINS from the collection remain visible until the transaction is complete.**

Taller & Cooper automatic toll collectors have been installed on the Garden State Parkway, New Jersey; Broadway Bridge, Kansas City, Mo.; Paseo Bridge, Kansas City, Mo.; New York State Thruway; Shenandoah National Park, Va.; and Wilbur Cross Parkway, Conn. More than a score of other orders are on hand for toll road, bridge and tunnel installations throughout the United States.

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Main Extension Charges

(*Continued from page* 99)

charges for taps but not for mains.

In Wayne, the subdivider pays $50 per tap as his share of the cost of bringing or providing water mains to his subdivision. This is called a "benefit charge"; a water tapping fee of $130 is also charged for which the water main is tapped and a ¾-in. water service to the property line and a meter installed. The subdivider is required to carry the water and sewer mains through his subdivision at sizes specified by the city to provide for the next subdivisions to be developed.

Wisconsin—In Algoma, the customer finances half the cost of the main minus 50 ft. until it is self-supporting. Beloit furnishes 50 ft. per customer free and so does Clintonville. Jefferson rebates for each active customer within 10 years, charging on a front foot basis. Kenosha charges $1.75 per front foot inside the city. Menasha charges $2. Merrill gives each customer 100 ft. Oconomowoc pays half the cost; in Elkhorn it is 1/3 by water department. Marinette charges $1 per ft. for 6-in. pipe. The water department pays all in Ft. Atkinson, Pewaukee has a 10-year plan to cover all the cost. Stoughton extends 50 ft. per customer and half for fire protection.

West North Central

Minnesota—Austin and Northfield require 6 percent return on the investment. Fairmont assesses $2 per front foot and Sauk Center $1. Duluth, Grand Rapids, Fridley, St. Louis Park and Sleepy Eye use the assessment method. St. Cloud pays the initial cost and is reimbursed later by assessment. Mankato pay 20 percent of the cost, plus the hydrants. Little Falls charges $75 per service connection. Red Wing reports consideration of a method, possibly front foot assessment.

(*Continued on page* 161)

Today's water Supply-

is your community's most valuable asset!

Badger Meters provide a precise check on usage and waste . . . first logical step towards conservation.

This perplexed citizen is a victim of water shortage — fast becoming a major problem in many communities. The tools he holds in his hands hardly equip him to fight for his rightful share — *he needs help from his water department.*

What YOU do *now* to safeguard *present water* supplies — to prevent situations like this —may play an important part in future development of your own community.

Metering all water for residential and industrial use is the first logical step towards knowing *where* and *how much* water is used—or wasted. Studies prove that water use in metered cities is reduced by as much as 33%.

Metering your water supply is a step made easy by the Badger Meter representative in your area. He can furnish complete data on many types of Badger Meters best suited for the specific needs of your community. For an appointment, at your convenience, write direct.

Fair rates for all users - greater income per year

One of the greatest "business machines" works for you — accurately and sensitively registering all flow. Large and small users alike pay fair shares to help keep water departments self-supporting.

Durability, dependability and low maintenance costs make community ownership of Badger Meters an investment in economy that pays dividends over the years.

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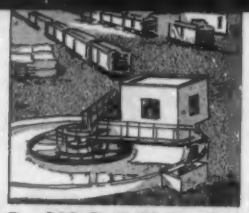

PUBLIC WORKS DIGESTS

THE INDUSTRIAL WASTE DIGEST

Land Disposal Of Beet Wastes

As a result of a 1953 evaluation of broad field disposal of sugar beet wastes at the Bayard, Nebraska, refinery of the Great Western Sugar Co., improvements were made in the disposal facilities. These consisted of the installation of a metal header and distribution flumes and modification of the dike structure to prevent short circuiting. Three 5-acre lagoons were added to and these provided greater BOD removal, nitrite and ammonia reduction and alkalinity reduction than the other areas of the disposal field. Average discharge of the raw waste was 7.1 cfs with a daily BOD load of 18,560 lbs., of which 12,127 lbs. were removed. Waste loss through infiltration was 3.09 acre-ft.—and through evaporation 0.18 acre-ft. Phosphate reduction occurred in the lagooned area but not in the remainder of the field. A lesser growth of algae was noticed in 1955, than in 1953, and this affected the action of the system on coliform organisms. While an 89 percent reduction in coliforms occurred in 1953, an increase was evident in 1955.

"Evaluation of Broad Field Disposal of Sugar Beet Wastes." By Glen J. Hopkins, Joe K. Neel, and Francis L. Nelson, USPHS, Kansas City. *Sewage and Industrial Wastes,* December.

Microbial Oxidation of Pure Carbohydrate

Because of the apparent inertness to microbial attack of calcium lignosulfonate in spent sulfite liquor, an investigation was made of the influence of this substance on the microbial oxidation rate of carbohydrate. The hexoses and pentoses present in spent liquor were used in the investigation. No evidence was found that calcium lignosulfonate in the presence of carbohydrate is converted into compounds having high BOD values. The presence of the former did not affect the rate of oxidation of hexoses during the first five days of incubation, but after this period a tendency to depress the oxidation rate of glucose and galactose was noted. A marked retardation occurred in the oxidation of arabinose and xylose. The addition of peptone and organic nitrogen improved acclimatization of microorganisms to carbohydrate and calcium lignosulfonate.

"The Microbial Oxidation of Pure Carbohydrate in the Presence of Calcium Lignosulfonate." By W. A. Lawrance and H. N. Fukui, Hedge Laboratory, Bates College, Lewiston, Maine. *Sewage and Industrial Wastes,* December.

Spray Irrigation With Tannery Wastes

The lagooning of settled wastes from the Eberle Tanning Co. at Westfield, Pennsylvania, was considered unsatisfactory from a maintenance cost viewpoint and because the lagoons in time would become filled with solids and rendered unusable. Sedimentation afforded a 58.3 percent reduction in BOD from a raw waste figure of 2,300 ppm, but the effluent BOD was still excessive for discharge to a stream. Spray irrigation of lagoon effluent on an adjacent field was attempted with favorable results. The system as completed in 1955 included 132 Rainbird Type 40 sprinkler heads covering 15 acres of land, and an 8-in. pipe header laid the length of the field, with 4-in. laterals every 60 ft. The wastes are pumped to the spray heads by a 1200 gpm 288 TDH Pomona pump powered with a 150-hp Diesel. A vibrating screen was installed to remove flesh and hair ahead of the spray nozzles.

"Tannery Waste Disposal by Spray Irrigation." By J. F. Eick, Eberle Tanning Co., Westfield, Pa. *Industrial Wastes,* Nov.-Dec.

Cooling Towers Oxidize Refinery Wastes

To help satisfy the dual needs of improving refinery waste effluents and recovering water for industrial purposes, a new method of utilizing waste waters has been developed that does not require extensive pretreatment. This is accomplished by selective segregation of wastes at their sources, gravity separation of oil and settleable solids in API separators, the use of an impounding basin for flow equalization and biological oxidation in refinery cooling towers. The use of cooling tower systems for oxidation is the result of efforts by the Sun Oil Co. at its Toledo, Ohio, refinery, and has been found to be appropriate for application of the method because of their high volume demand and their potential ability to effect biological oxidation of pollutants in refinery wastes. In the re-use cycle, a gas stripping tower was installed to remove sulfides and mercaptans.

"Biological Oxidation of Oil Refinery Wastes in Cooling Tower Systems." By H. F. Elkin, E. F. Mohler, Jr., and L. R. Kumnick, Sun Oil Co. *Sewage and Industrial Wastes,* December.

Primary Treatment of Paper Mill Waste

In selecting a site for a waste treatment plant the possibility of gravity flow should be considered. If the mill sewer location with respect to ground water level is such that excavation will not extend more than 5 ft. below ground water level, construction of a tank in the ground is feasible. Sometimes waste can be piped directly from the operating floor to make gravity flow possible. Recommended settling tank design criteria consider detention period and overflow rate. These are, respectively, in hours and gal. per sq. ft. per hr.: 4 and 20 for deinking waste; 3.5 and 25 for deink-white water mixture; 3 and 30 for board mill waste; and 2.5 and 35 for white water waste. A freeboard of 6 to 12 inches is usually sufficient; the width of the launder should be regulated so that maximum velocity in the launder does not exceed 2 fps. If a circular tank is used, a floor slope of 1 to 1½ in. per ft.

from periphery to center sludge well is desirable to facilitate sludge accumulation and removal.

"Design Factors for Primary Treatment of Pulp and Paper Mill Waste." By Anthony J. Palladino, National Council for Stream Improvement, Kalamazoo, Mich. *Industrial Wastes*, Nov.-Dec.

Acid, Alkali and Sewage Treated Separately

The Stratford, Conn., factory of the Sikorsky Aircraft Div., United Aircraft Corp., collects and treats acid, alkaline, and domestic wastes separately, considered more effective and economical than combined treatment. Sewage passes through a comminutor and a sedimentation tank. Sludge is handled by a floating cover digester. Acid wastes include pickling rinse, spent acid liquors, chromic acid, chrome-salt rinse water, and spent plating liquid. These are subjected to acidification, reduction of hexavalent chromium by sodium bisulphite and neutralization with soda ash on a batch basis in Saran-lined tanks. Alkaline wastes from cleaning and cyanide plating operations are treated with lime to a pH of 11 and then chlorinated. Control of the pH of both wastes is made possible through indicating and recording equipment, which checks automatically on the performance of all equipment.

"Acids, Alkalis and Sewage Handled Separately in Composite Plants." By J. G. Albertson, Bowe, Albertson and Associates, Consulting Engineers, New York. *Wastes Engineering*, December.

Creosote Hampers Sludge Digestion

Laboratory scale experiments were used to measure the effect of creosote on sludge digestion. In three separate runs, to 2000 ml. of equal parts raw and digested sludge, 1000 ml. of raw sludge, and 1000 ml. of digested sludge, respectively, 33 ppm of creosote mixed with alcohol were added. Daily gas production was measured. In the mixture of raw and digested sludge with creosote, the gas production was only a fraction of that in the sludge mixture to which no creosote was added. In comparing the effects of creosote on raw and digested sludge, it was noted that creosote depressed gas production to a greater extent in raw sludge than in digested sludge. A marked lowering of pH in the raw sludge—creosote mixture was also observed.

"Digestion of Raw Sludge Impaired by Presence of 33 PPM of Chemical." By B. I. Garland. Atlanta, Ga. *Wastes Engineering*, December.

Industrial Waste Analysis Techniques

Analytical work in progress does not appear adequate in relation to the expanded waste control problem anticipated in the future, considering water use and industrialization. Means for continuous recording of dissolved oxygen, organic concentration, pH, conductivity, oxidation-reduction potential and color are available in controlling wastes or stream quality. Further instrumentation for other purposes is needed. Increasing use of bioassay techniques is likely, and there is a trend toward sharpening the specificity of the identification of waste components. Modification of the traditional procedures of BOD, oxygen consumed, and the nitrogen determinations has received attention, and they need further evaluation to adapt them to better use in the examination of industrial wastes.

"Recent Trends in the Analysis of

Industrial Wastes." By W. Allan Moore and M. B. Ettinger, R. A. Taft Sanitary Engineering Center, Cincinnati, Ohio. *Analytical Chemistry*, December.

Reclamation of Sewage for Industrial Use

Basically, there is little difference between treating a sewage effluent and any other water supply which might be used by industry. Acceptable costs of treatment must be evaluated in the light of the ever-changing situation of water supply and demand. Successful industrial use of sewage effluent has been accomplished by the Bethlehem Steel Corp. at Baltimore, the Kaiser steel plant at Fontana, Calif., the Cosden Petroleum Corp., at Big Spring, Tex., and the Texas Co. refinery at Amarillo, Texas. Specific problems which might occur are overcoming sanitary hazards to employees at the industry, considering the relatively higher temperature of sewage, and avoiding the possible detrimental effects of constituents such as chloramines, ammonia, detergents and radioisotopes. The effect of microorganisms on wood structures of cooling towers for example, should be considered. These problems, however, are capable of solution through intelligent appraisal and engineering knowledge.

"Adaptation of Treated Sewage for Industrial Use." By Sheppard T. Powell, Baltimore, *Industrial and Engineering Chemistry*, December.

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Main Extension Charges

(*Continued from page* 156)

Iowa—Cedar Rapids charges $2.50 per lineal foot and Clarinda $1.50 per abutting front foot for 35 percent of the abutting footage. Centerville allows 100 ft. per customer and requires cash for the balance. Sibley allows 300 ft. for four customers. In Waverly, water mains are provided free if sewers and streets are installed by the developer. Humboldt requires the developer to pay for trench and backfill plus $75 for each 3/4-in. service. Mason City has a 10-year plan with credit for water used. Ottumwa charges $1 a foot for frontage, each side, with a maximum investment by the water department of $75 per connection.

Missouri—Boonville pays for extensions; Cape Girardeau has a refund plan. Frederictown furnishes pipe which developers install. Liberty refunds $50 per tap to the developer. Florissant refunds 50 percent of customer bills, not to ex-

ceed 50 percent of total cost, to the developer. Higginsville requires customers outside the city to pay all costs and limits lines in the city to 200 ft. for any one customer. Lebanon allows $40 per service. St. Louis refunds for each customer and Springfield charges for that portion of the cost over four times the estimated annual revenue.

North Dakota—All North Dakota cities reporting appear to have an assessment procedure except Valley City where the owner pays.

South Dakota—Winner has a refund plan. Brookings charges on the basis of footage.

Nebraska—Kearney charges $1 per front foot for each side of the street. Nebraska City reports a new policy under consideration. Broken Bow uses special assessments. Most of the other 12 cities reporting charge the developer full cost.

Kansas—Emporia requires a deposit which is refunded as connections are made. Newton is considering a new policy. In Parsons the developer installs and the city purchases back. Yates Center pays $140 for each user. Salina charges $1.50 per front foot served. In Larned, mains are placed without charge.

South Atlantic States

Delaware—In Wilmington, developers contribute toward extensions and bear full costs within the development.

Maryland—Hyattsville makes a front-foot benefit charge.

District of Columbia—The assessment is based on the abutting front footage.

Virginia—Danville reimburses the developer as active customers are connected. Hopewell provides 60 ft. of main per customer. Martinsville installs water service in return for other improvements by the developer. Galax pays half the cost; Lynchburg requires a 10 percent annual guarantee.

North Carolina—Albermarle pays 1/3 the cost; inside the city, Darlington will lay 200 ft. for each tap but the developer pays the entire cost outside. The developer furnishes the pipe and the city lays it in Clinton, Asheville and Cherryville. Smithfield extends lines at its own expense while Tarboro has a refund plan. Winston-Salem allows $175 per lot. Henderson charges actual cost, less 100 ft. of line per customer. Salisbury has a set price per foot based on 6-in. mains, but corner lots have certain exemptions.

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South Carolina—Camden requires the developer to pay the entire cost and to deed lines to the city which collects tapping charges plus 50 cents a front foot as lots are developed, remitting this 50 cents per front foot to the developer. In Gaffney, a 10 percent deposit is required which is returned if half the lots are developed.

Georgia—The developer pays for the mains, but when revenue grosses 8 percent, Athens refunds the money. Atlanta and Forsyth have reimbursement plans.

Florida—In Key West, costs are borne 2/3 by the developer, 1/3 by the utility. Marianna extends lines at its own cost but if this exceeds 4 years' revenue, the developer pays the difference. Panama City refunds 50 percent of the annual revenue until the developer is repaid. Pensacola designs, constructs and invests $90 per unit, the developer the balance. Tampa shares the cost on a revenue return basis. Other cities (13) reporting indicate that the developer pays all or part.

East South Central

Kentucky—Carrollton furnishes 50 ft. for smaller lines, the developer putting up the rest, and there is a refund of 50 ft. for each house built. Shelbyville requires the developer to pay 50 percent of the cost which is rebated for each connection within 5 years. Hopkinsville refunds over a 3-year period, the developer advancing the cost. Murray also has a refund arrangement.

Tennessee—Kingsport and La Follette have a 5-year revenue plan. In the other 10 cities reporting, the developer generally pays all.

Alabama—In Fairhope, the Water Department allows $100 for each house built against the cost of the extension. Leeds charges the developer for everything above four times the annual revenue. Alexander City installs at no charge. Cullman requires a payment of $30 for each water service; but Jackson charges only for the new pipe.

Mississippi—Clarksdale has a deposit and refund system; Mississippi City allows 50 ft. of main per house. Natchez installs facilities without charge.

West South Central

Arkansas—Of 15 cities reporting, the owner or developer pays in 7, wholly or in part. DeQueen charges for material and labor; Harrison charges for material. Arkadelphia reimburses for each new service and Magnolia reimburses from revenue.

Louisiana—Baton Rouge and Shreveport have refund arrangements. Lake Charles charges $2 per foot.

Oklahoma—Elk City refunds one-twentieth of the revenue until the developer is paid. Oklahoma City repays from 50 percent of the project revenue. Pryor also has a refund plan. Within the city, Stillwater extends mains 100 ft. per customer.

Texas—Refund plans are reported by Albany, Brady, Haltom City, Seguin, Snyder, Sweetwater, Colorado City and Del Rio. Dalhart lays 150 ft. for a service. Ft. Worth pays half the cost, but there is no refund. Perryton extends 150 ft. per house; San Saba allows $20 per customer. Tulia pays half the cost of labor and materials. Bay City refunds the developer a cost of 150 ft. per customer; Coleman charges for all beyond 150 ft., El Paso charges $1.14 per inch per front foot. Midland charges per front foot. In McKinney and Pearsall, costs are split.

Mountain States

Montana—In Butte, the developer pays but is refunded revenue for first three years.

Wyoming—Powell furnishes lines without cost; Casper charges a part of the cost to development. In Riverton, the developer pays all the cost.

Colorado—Of 7 cities reporting, the developer pays in five. Delta pays for 100 ft. per user; and in Monte Vista, the water department "pays". Boulder requires the developer to pay for lines through 8-inch in size.

New Mexico—Raton requires a revenue of 1 percent a month; Roswell charges $3 per front foot per lot. In Santa Fe, the developer pays the cost of the extension, but refunds are made for new customers until the cost is repaid, or for 5 years. Hobbs, on extension to new areas, lays the first 100 ft. free; then $2 per foot until the property is reached; then $1.50 per lot foot to serve the addition. The city pays for all street crossings and all lines necessary in streets; also for fire hydrants. All service lines are laid from the alleys. The city will bypass a lot not wanting service so the customer pays only for his lot.

Arizona—Eloy bases its refund on the number of meters installed, but in Glendale and Safford, the developer pays all of the cost. Phoenix repays half of the revenue until the total cost is covered. Tucson uses two methods: (1) A charge of 75 cents a front foot, not reimbursable; or (2) payment by the developer and reimbursement partly from the receipts.

Resurfacing with Reinforced Asphaltic Concrete

ABOUT 9,000 ft. of 150-ft. wide runway and 1,000 ft. of 74-ft. wide taxiway at the Houston, Tex., airport have been resurfaced with reinforced asphaltic concrete The original pavement was laid in 1942 when 30,000-pound planes were normal. The airport is now used by planes weighing 90,000 to 105,000 pounds. Before resurfacing the damaged areas were removed and concrete with oyster shell for aggregate was used to bring the runways to a smooth surface. A layer of 1 inch of sheet asphalt was then placed. This was topped with 6 x 6 No. 10 wire fabric and covered with 3 ins. of asphaltic concrete. Fabric mats were lapped 6 ins. On the outside 40-ft. wide strips of the runways, fabric was placed only over the joints in the pavement.

Nevada—In Carson City, the subdivider puts in mains and the water company pays him 25 percent of the customer bills for two years. In Henderson and Las Vegas, the developer pays for the extension and is repaid by 15 percent of the revenues for 10 years.

Pacific Coast States

Washington—Skagit County invests $100 per customer and the developer pays the rest, with refunds for new customers. Auburn charges $2 per front foot. Wenatchee charges $2.50 per front foot but pays all other costs.

Oregon—Eugene requires a 6 percent return; La Grande charges by the front foot and decides the size of pipe to be used. Roseburg invests $120 per service; the remaining cost must be paid in cash.

California—Replies were received from 70 cities, with nearly all known methods being reported. Baldwin Park returns 25 percent of the revenue for 10 years or until paid. Benecia rebates 35 percent of gross revenue annually. Napa also repays from revenue, but no rate is given. Novato rebates 25 percent of revenue annually against 50 percent of the advance by the subdivider. San Rafael rebates one-third of the revenue for 5 years. Millbrae and San Marino use the refund method.

Compton charges $1.50 per front foot; E. Pasadena pays for 65 ft. of line for each new service; Fresno charges $2.50 per front foot, Oxnard $2.00, Alhambra 60 cents, Ontario $1.50 and Victorville $3. Pomona charges $200 per lot, which is not refundable. Burbank has a standard charge based on existing systems and the developer pays all costs over this. Pasadena charges $1.50 per front foot with allowance for intersections. Orange charges on a front foot basis but does not state the charge.

In most other California cities, it appears that subdividers pay all of the cost, though there are frequent concessions when pipe exceeds 6-in. in size, as Oakland; or 8-in., as Davis. Arcata brings water to the edge of the subdivision. Lindsay refunds "after the tract is built up."

• • •

Traffic Timer Measures Speeds Electrically

An electrically operated traffic timer which measures automobile speeds over an 88-ft. distance has been put in operation by Golden, Colo. This device gives a direct speed reading.

● SALT-SPREADING crews demonstrate their readiness to apply rock salt quickly when snow starts.

Industry Requires BARE PAVEMENTS *All Winter*

DAVE MANN,
Director of Public Works,
Niagara Falls, New York

THIS IS THE sixth year that we have used straight rock salt to maintain bare pavements during the winter months. Our story may be helpful to others who do not now use straight rock salt and yet are charged with the responsibility of keeping streets under their jurisdiction open and safe for winter traffic.

Our city has a population of about 100,000 and is heavily industrialized, with plants of many large companies such as Hooker Electrochemical, Carborundum, Union Carbide and Carbon, and Olin-Mathieson. Generally, these large industrial installations work round the clock with three-shift systems. We have harsh winter weather on our 175 miles of streets; if snow and ice are allowed to accumulate on any of this mileage, it causes economic loss and hardship to our community.

Like others, we arrived at the use of straight rock salt gradually. Our original ice control program relied entirely on plows and cinders. For years we piled more and more cinders on our slippery streets; our sewers quickly clogged; and we could cover only part of our total mileage. Even our most important streets were far from safe. In many cases, accumulations of ice and imbedded cinders had to be chipped away. This was expensive and time-consuming.

We then went to a combination of cinders and salt. Our road program improved, for we could now cover more streets, the area we did cover was safer, and our sewers did not fill up so quickly. Finally, we arrived at the use of straight rock salt. The combination of plows, straight rock salt plus good equipment and personnel, and a well-organized system gives us a program of which I am proud and which I believe every ice belt community should adapt to its own situation.

Ice Control Program

Our present bare pavement maintenance program is simple. We have divided the city into nine ice control zones. Each zone has its own equipment and a specific crew assigned to it. We originally determined the size of the zones by the relative importance of each of our streets and have had to make very few modifications since. Personnel of each zone know exactly how to proceed when given the order. Each street within each zone is given a priority and only on rare occasions does the pattern of salting vary.

Timing is one of the most important aspects of our program. Our equipment, therefore, is kept in constant readiness along with our men. We realized during our first year of using straight rock salt that a really successful program depends on getting our equipment into operation in the first few minutes after a storm strikes. We have found that, with our methods of storing rock salt, the only way to get our trucks in service without delay is to keep them loaded. We have ready for operation, at all times, ten tailgate spreaders which are easily attached to trucks and removed when not in use. The 1955-56 winter was rough —there were so many storms that we had to spread salt 22 or 23 days out of each month.

Our salt spreaders go out immediately when ice starts to form or snow starts to fall. Generally, we spread about 300 to 400 pounds of rock salt per mile on a two-lane street. If a heavy snowfall is anticipated, about 100 pounds additional per mile are spread. By catching the storm with rock salt in the very beginning, we find that we usually do not have to do anything more; but if the fall approaches four inches we get out our 30 plows and two large road graders.

Plowing is made simple by the action of the rock salt which works down to the pavement and spreads out, breaking the bond between the snow or ice and the pavement; plows can quickly push most of the accumulation to the side. Usually the salt and brine that remain is

enough to finish melting away whatever snow and ice is left on the road surface. If not, a light additional salting is applied. Within a short time, our streets are usually completely bare and dry, only a bit of white salt powder remaining.

Because a truck load of rock salt goes much further than the same amount of cinders or cinders and salt, our coverage of the entire city is quicker than before. It takes us about eight hours to cover all of our streets. Although delays in getting to work were common for our thousands of industrial employees when we were using cinders and cinders and salt, it is now rare that our street conditions cause any delay. And, according to Charles J. Gorman, our Chief of Police, our winter roads are safer than they have ever been.

We mentioned previously that we keep our trucks loaded with rock salt and ready to go. Readiness, in fact, is the keystone of our entire bare pavement maintenance program. Early in the season we receive our salt from the International Salt Company. It arrives in hopper bottom cars which dump directly into a small hopper under the tracks in an old steam engine roundhouse that we use for storage. A continuous conveyor system takes the salt from the dump hopper and piles it alongside the tracks. The rock salt is then loaded into our trucks by another continuous conveyor from the edge of the storage pile.

We have had no difficulty with our rock salt caking but now we are contemplating ordering our entire season's requirements early in the summer. To make sure that our storage piles do not cake, we will probably use International Salt's anti-caking agent, Storite. Having seen this product successfully used on several nearby rock salt storage piles, I am impressed with its ability to keep rock salt free-flowing in any weather and for any length of time. Besides using Storite on our storage piles, it will probably be valuable on our trucks, as well, since their loads may remain aboard for several weeks.

Our bare pavement maintenance program is functioning smoothly and is giving us safer streets in a shorter time and for less cost.

• • •

The Most Beautiful Bridges Built in 1955

Sixteen bridges in ten states have been chosen from 80 entries as the most beautiful bridges in the country opened to traffic in 1955, in the American Institute of Steel Construction 28th Annual Aesthetic Bridge Competition.

The Class I winner for bridges with spans of 400 feet or more was the Missouri River Bridge, Leavenworth, Kansas. Honorable mention were the Jefferson City-Missouri River Bridge; the Fort Henry Bridge over the Ohio River, Wheeling, W. Va.; the Tappan Zee Bridge across the Hudson River on the New York Thruway; and the Barnhart Island Bridge over the St. Lawrence River at Massena, N. Y.

The Class II winner, for bridges with spans under 400 feet, costing over $500,000 was the Ohio Turnpike Bridge over the Cuyahoga River. Honorable mention winners were the Cattaraugus Creek Bridge, Springville, N. Y.; the Queens Blvd. Bridge of the Long Island Expressway, Borough of Queens, N. Y.; the Distribution Structure Overhead Addition, Oakland, Calif., and the Colorado River Bridge near Moab, Utah.

Class III, for bridges with fixed spans under 400 feet and costing less than $500,000, first place went to the Old State Route 8 Bridge, over the Ohio Turnpike, southeast

of Cleveland. Honorable mention went to the Snake River Bridge, Palisades Reservoir, U. S. Highway 39, near Alpine, Wyo.; the Archibald Ave. Bridge, Riverside County Line, Calif.; the Blue Bridge, Johnson St., Cumberland, Md.; and the Hoover Dam Bridge, ½ mile north of the village of Central College, Franklin County, Ohio. The Class IV movable span bridge chosen was the Welfare Island Bridge, spanning the East channel of the East River from Queens to Welfare Island, N. Y.

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Alternating Double Filtration

(*Continued from page* 126)

the biological film. Three weeks after the first application, between 30 and 40 percent of the detergent was being removed and after 13 weeks the proportion removed reached a fairly steady value of 60 to 70 percent.

Application of the "t" test showed that there was no significant difference between the filters in respect to the percentage reduction in BOD. The average percentage of ammonia removed by the filter treating detergent was 86 percent and by the control filter 91 percent. Though small, this difference is statistically significant. An average of 61 percent of the permanganate demand was removed by the control filter compared with 47 percent removed by the filter treating sewage and detergent. As far as the evidence of a single such experiment could be accepted, the laboratory gathered that the stated concentration of detergents slightly reduced the efficiency of sewage treatment. In a previous year's experiment, a similar mixture in concentration equivalent to 10 ppm sodium lauryl sulphate had no detectable effect.

Study of Double Filtration

To help meet the need for assessing the value of the alternating double filtration process under varying conditions of loading, some observations have been made by the Stevenage laboratory on the operation of the Bedford plant through the courtesy of the Borough Engineer of Bedford. The extensions to the plant completed in 1954, included alternating double filtration capable of treating an average dry weather flow of 2.5 mgd. The then existing filters provided also for ordinary two-stage filtration for a dry-weather flow of 1.1 mgd. The alternating plant is believed to be the first new works of its kind of comparable size and includes four new sedimentation tanks, giving nine hours detention, and six new humus tanks, giving altogether five hours detention. Each individual filter must be capable of being connected either as a primary filter or as a secondary filter. After a period of about a day, the filters are reversed or "alternated." By employing this method it has been found that the rate of dosage on the filters may be increased to about two-and-a-half times that possible with ordinary double filtration. The filters are designed to deal with 200 gallons per cu. yd. of filtering media per day. When the filters are in series, the rate through each filter is thus 400 gallons per cu. yd. per day.

Since it is not physically feasible to filter the sewage at the rate of 1,200 gallons per cu. yd. per day (the rate, equal to three times the dry weather flow, to which the flow may rise in times of rain), the filters are placed in parallel and provide single-stage filtration only when the flow increases over 1½ times DWF. In this way the rate through any filter does not exceed 600 gallons per cu. yd. per day. This changeover and its reverse, is automatic, and the rate of pumping is

automatically adjusted to suit the normal daily variations in the rate of flow.

Passing through a Venturi tube, the desired proportion of the effluent from the sedimentation tanks, 2.5 mgd, flows through a 36-in. pipe into the left side of an open elevated chamber. From this part of the elevated chamber the sewage flows to a 30-in. line to which each filter is connected. The connections are controlled by hand-operated valves so that when a valve is opened, the filter is operating as a primary filter.

Between the two banks of filters are three channels to take the filter effluents, the center channel being for effluent from the primary filters; the interconnected outer channels are for effluent from secondary filters.

At the outlet from each filter is a penstock. When this is open, the filter effluent discharges into one of the two outer channels. When the penstock is closed, the filter effluent backs up until it discharges over a short weir into the center channel. Thus, at any particular filter, when the valve is open, the penstock should be closed and the filter is set to operate as a primary filter.

From the primary filters the effluent passes through the center of the three channels and flows to the primary humus tanks whence it gravitates to the pump sump. The sewage is then pumped to another overhead chamber which feeds a second 30-in. pipe, to which each filter is also connected. When the valve from this overhead chamber is opened, the filter is operating as a secondary filter, and the filter effluent flows to one of two outer channels. These interconnected outer channels discharge to a pipe leading to the secondary humus tanks. As the controls of each filter are independent, complete flexibility of operation is possible.

Opening the automatic penstock between the overhead chambers and stopping the pumps place all filters in parallel, no matter how the individual filter valves and penstocks have been set. As the pumps are stopped, the level in the sump rises until the sewage spills over the overflow and thence to the secondary humus tanks. Although part only of the filter effluent is thus directed through the primary humus tanks, this is unimportant since all the effluent is treated in the secondary humus tanks. Closing the automatic penstock again between the two overhead chambers and restarting the pumps causes normal primary and secondary filtration to be resumed.

Although it is not possible to predict which of the many possible variations of sewage treatment with rotary filters which may be developed in the future will yield the best results with a particular sewage, provision has been made at Bedford for recirculation of effluent, possibly supplementary to the alternating double filtration. This may be effected by running the chosen number of pumps with the automatic penstock open between the two overhead feed chambers. A hand penstock is also provided so that the old filters can also be dosed by recirculation.

The Venturi tube in the pipeline is used to measure the rate of flow and thus to control the automatic changeover between series and parallel working. In connection with the need to vary the rate of pumping to suit the rate of flow to the pump sump, account is taken of the fact that the delivery of a primary filter effluent to a secondary filter is, in the main, a means of restoring the condition of a filter which has recently done a spell of duty as a primary filter and has just been changed to a secondary filter. It matters little, therefore, if

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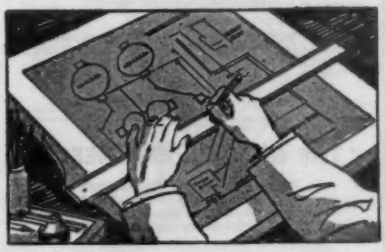

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not quite all of the primary filter effluent is passed to the secondary filters and some overspill simplifies the pump control method.

Six pumps having the following capacities are provided: Two at 350 gpm; two at 700 gpm; and two at 1,050 gpm. By switching the different pumps it is possible to increase the pumping rate in stages of 350 gpm from zero to 4,200 gpm. A V-notch is provided in the overflow weir in the sump, and when the flow over this reaches 350 gpm, the pumping rate is increased automatically by 350 gpm. When the flow over the V-notch falls to zero, the pumping rate is automatically reduced by 350 gpm. The average quantity passing over the V-notch is thus 175 gpm which represents about 10 percent of normal DWF.

By means of a plug-and-socket device on the control panel the sequence of automatic pump operation may be varied at will to equalize the wear on the pumps and to allow for any pump being taken out of commission.

Two switches are incorporated in the flow indicator on the control panel. These close at predetermined rate of flow. One switch is set to close at about 1½ times DWF. This brings into operation a time-delay mechanism; the second switch is set to close at about twice DWF and is immediate in effect.

When the rate of flow has remained above 1½ times DWF for the present time, or immediately it reaches twice DWF, a circuit is closed which brings about the opening of the automatic penstock between the overhead chambers and the stopping of the pumps. The filters are then in parallel. A reverse action takes place when the flow falls again to normal.

Provision is made on the control panel for the pumps and the penstock to be controlled either automatically or by hand. Should the electricity supply, upon which the operation of the system depends, fail, the plant continues to operate under parallel conditions, providing single-stage filtration until the power is restored.

Observations of this plant by the Stevenage laboratory were first made during December 1954; but, because of wet weather, the plant was for some time treating storm flows by single filtration. When alternating double filtration was in use, settled sewage was being treated at more than double the rate commonly used for single filtration, and the average BOD load of 0.31 lb. per cu. yd. per day was

about double the usual load. An excellent quality effluent was produced and a substantial degree of nitrification took place. The plant performed satisfactorily when treating storm flows with an average BOD of 79 ppm at an average rate of 365 gallons per cu. yd. per day, mainly by single filtration.

During a second series of observations, which took place from mid-July to mid-August 1955, the weather was dry, and, except for a period of less than two hours alternating double filtration was being used, the frequency of alternation being once a week. Samples of settled sewage, settled primary effluent and unsettled secondary effluent were taken every two hours. Composite samples were prepared from sets of four consecutive samples in proportion to the flow to give for each day three eight-hour composite samples representing periods of 9 am to 5 pm, 5 pm to 1 am, and 1 am to 9 am. It was not possible to obtain samples of settled secondary effluent from the alternating double filtration plant because this is mixed with effluent from the old plant entering the final humus tanks. Samples of unsettled secondary effluent were therefore settled in the laboratory.

Average results of analyses are as follows: From July 13 to 19, waste liquor from the gas works was discharged to the sewage plant. During this 6-day period, settled sewage BOD was 234 ppm and secondary effluent BOD was 8 ppm. During the period July 19 to Aug. 12, there was no gas liquor reaching the plant. Settled sewage BOD was 236 ppm and secondary effluent BOD was 6 ppm. For the entire period, July 13 to Aug. 12, settled sewage BOD averaged 236 ppm and secondary effluent 6 ppm.

The average BOD loading, in pounds per cubic yard per day, applied to the primary filters for the three periods listed above was 0.74, 0.62 and 0.64. There was removed in the primary filters and the humus tanks, during the same three periods, 0.66, 0.56 and 0.58 pound per cu. yd. per day. There was removed in the secondary filters, correspondingly, 0.06, 0.04 and 0.06 pound per cu. yd. per day.

The permanganate value, for the settled sewage was, for the three periods, 76, 47 and 53 ppm respectively. The corresponding values in the secondary effluent were 11, 8 and 9 ppm. Ammonia, in ppm of N for the settled sewage, was 31, 28 and 28 for the three periods; and uniformly 1 ppm in the secondary

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ATLANTA

WATER SUPPLY, SEWAGE DISPOSAL, INCINERATORS, POWER PLANTS

effluent. Nitrite plus nitrate in ppm for the secondary effluent was 26, 22 and 23.

The average rate of application of settled sewage was 135 gallons per cu. yd. per day; the maximum rate and minimum rate during any eight-hour period were respectively 306 and 61 gallons per cu. yd. per day. With an overall average loading of 0.32 lb. BOD per cu. yd. per day, effluent from the secondary filters was of uniformly good quality. The BOD, after settlement of the effluent in the laboratory, was greater than 10 ppm during only one eight-hour period. The maximum and minimum loads during any eight-hour period corresponded respectively to 1.05 and 0.11 lb. BOD per cu. yd. per day.

Gas liquor is normally pumped to the sewage works at a rate of 400 gallons per hour from 8 am to midnight and at half this rate for the remaining eight hours. During the Stevenage laboratory observations, however, the pump at the gas works broke down, on 19th July, and no gas liquor was received thereafter, resulting in a marked fall in the permanganate value of the settled sewage and a significant reduction in both the BOD and the permanganate value of the secondary effluent.

The laboratory states that a difficulty in interpreting the results of the five-day BOD test is that when it is applied to an effluent, such as a sewage effluent, containing both carbonaceous matter and ammonia, oxidation of the organic carbon usually proceeds from the beginning of the period of incubation, but oxidation of ammonia may or may not begin during the period of five days. It is believed that if such an effluent were discharged to a river, the lag period before oxidation of ammonia appeared would be much shorter. Nitrification may also depend on the nature of the dilution water used and the nitrifying flora created by the oxidation of its ammonia content.

In the preparation of this article the writer acknowledges with grateful thanks a recent report of the Water Pollution Research Laboratory kindly supplied by the Department of Scientific and Industrial Research and an account of the alternating double filtration plant at the Bedford Sewage Works compiled by W. H. Norris, B.Sc. (Eng.) Lond., A.M.I.C.E., M.I.Mun. E. and kindly supplied by the Borough of Bedford Engineer and Surveyor, T. W. Dawkes, B.Sc. (Eng.), A.M.I.C.E., M.I.Mun.E., A.M.T.P.I.

PUBLIC WORKS
EQUIPMENT NEWS

Published Monthly February, 1957

Dotmar Rotary Brush Cutter-Chipper

This rotary brush cutter and chipper is designed for mounting on any small tractor and is powered through the power take-off by a shaft to the gear box on the rotary cutter. This gear box is of the automotive differential type. The specially designed cutter blade revolves at high speed and will cut off brush and saplings up to 2 inches in diameter. This blade has offsets with additional chipper blades bolted on which chops up brush into short pieces after cutting. The rotary cutter is safety shielded so stones and sticks cannot fly up and hit the operator. The unit slides on runners, adjustable for height, cuts within ½" of ground, if desired, and

Unit is designed for mounting on any small tractor and slides on runners

can be off the ground for road travel. Further information from Dotmar Industries, Inc., 502 Hanselman Bldg., Kalamazoo, Michigan, or circle **No. 2-1** on the reply card.

Paving Boxes For Road Construction and Maintenance

Four paving boxes are being manufactured by Creative Metals Corp. One is a high speed trench paver adjustable in any increment down to one foot. The other paving boxes are in 8 and 9-foot spread widths with side gates for controlling volume of joint material. Insert plates provide intermediate widths. The paving thickness is quickly adjustable (by a worker who rides the screed) from a half inch to eight inches. The operating handles which control the speed thickness can be pitched for non-uniform grade patching or other uses. These pavers are truck-towed to operate, and are carried from job-to-job on the truck's tail gate. Complete details from Creative Metals Corp., 1290 Powell Street, Emeryville (Oakland), Calif., or circle **No. 2-2** on the reply card.

Boxes can spread crusher run rock, cement treated base and asphaltic mixes

Effectiveness of Trafficones Increased During Dark Hours

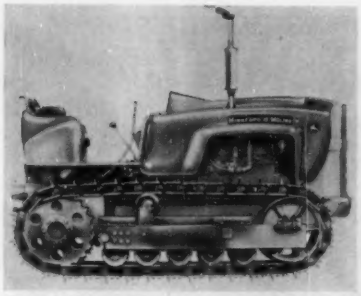
The efficiency of trafficones has been doubled with the introduction of new reflector cone caps. Produced by A & B Reflectorizing Co., cone caps provide a simple way to light up trafficones for night use. The caps are constructed of white or red Scotchlite permanently bonded to heavy gauge aluminum. These are 3 inches in depth (covering the normal red top of the trafficone). There is no maintenance or up-keep cost. Designed for use on all trafficones, regardless of size, the caps provide additional protection for workmen and equipment during the dangerous, dark hours. For further information write A & B Reflectorizing Co., Dept. P-206, 5508 North Halifax, Arcadia, Calif., or circle **No. 2-3** on the reply card.

Riding Tractor For Maintenance Departments

A new, more powerful riding tractor featuring a 6.6-hp Kohler engine is now available from Bolens Products Division. This engine provides ample power for both the tractor and a complete line of attachments. Special features of the Super Ride-a-Matic is the Versa-Matic no-clutch drive. This drive permits speeds to 5.5 mph forward, and up to 4.5 mph in reverse, without shifting, clutching, or stopping, while permitting the engine to run at constant speed. Attachments available for use with the unit include: 30-inch front-mounted twin-blade rotary mower; 3-gang mowers; 8-blade disk harrow; sickle-bar mower; combination snow plow and grader blade; 30-inch reel-type mower; and circular saw unit. Complete details can be obtained by writing to Bolens Products Div., Food Machinery and Chemical Corp., Port Washington, Wisc., or circle **No. 2-4** on the reply card.

Minneapolis-Moline Crawler Tractor

The first of a completely new line of crawler tractors has been announced by Minneapolis-Moline. The new "Golden Kat" in the 57 brake hp class, to be available with diesel or gasoline engines, has major engineering advancements that include a 5-speed sliding gear transmission, and a torque converter working in conjunction with a reverse shuttle gear. An independent PTO unit, driven directly from the engine crankshaft, is controlled through a separate over-center, wet-type clutch which can be engaged or disengaged without slowing or stopping the engine, and is available in a selection of output shaft speeds. For full control of any combination of industrial and construction equipment, a large selection of rear mounted, constant-running hydraulic pumps will be available. Tracks for the new crawler are available in 10, 12 and 14-in.



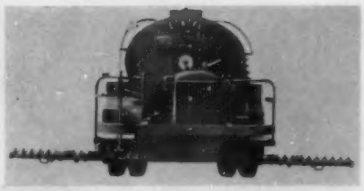
Construction and maintenance tractor widths, and with 42 or 52-in. treads. A new and simplified steering system consists of a combination clutch and brake unit mounted on the high-speed differential shaft and operated by the same lever. For further information write Minneapolis-Moline Co., Box 1050, Minneapolis 1, Minn., or circle **No. 2-5** on the reply card.

New Type of Foundation Pile

A new type of foundation pile proved by field tests to have exceptional strength characteristics, especially during driving, has been introduced by L. B. Foster Company. The pile, called the Foster rail pile, is made from three steel rail sections welded together at base edges to form, in cross section, a hollow equilateral triangle with rail heads extending outward at 120 degrees. Because of the thickness and rigidity of the rail heads, the pile can push aside obstructions or punch through tough strata without damage or deflection. The compact cross section of the pile, with its short, heavy webs and three thick flanges, protects the pile from longitudinal tearing during driving. It can be driven with any set of conventional leads and hammers. No mandrels or other special equipment is necessary. Rail pile tests were made in cooperation with Western Foundation Corporation, New York City, before a group of contractors, engineers and representatives of state highway departments. In a driving test, rail piles of different weights were driven approximately 80 feet to refusal on bedrock with a Vulcan No. OR hammer with a rated capacity of 30,000 ft/lbs. In another test to determine the rail pile's strength at final refusal, an H-pile was driven several feet into bedrock, then capped with a five inch anvil plate. Different lengths and weights of rail piles were positioned on the plate and struck with a hammer equal to a No. 1 Vulcan. Each pile received from 200 to 300 blows without damage. Rail piles will be supplied by Foster in sizes ranging from 60 to 133 lbs. per foot, and in lengths from 28 to 39 feet or multiples. Sections of rail piles can be butt-welded in the field for especially deep driving. For further information write L. B. Foster Co., 11 Park Place, New York 6, N. Y., or circle **No. 2-6** on the reply card.

Full Circulating Turn-Up Spray Bar

An entirely new full circulating turn-up bituminous spray bar has been announced by E. D. Etnyre. Full circulating for uniform application, the bar inverts 90° from spraying position—assuring complete drainage and eliminating any chance of drip from nozzle valves. An individual valve for each nozzle permits independent nozzle operation over the entire length of the bar. When not spraying, material can be circulated the full length of the bar with extensions in either spraying or folded position. The bar shifts to follow the edges of road, and adjusts for proper height of spray. Ends fold, raise and lock for traveling. For full details write to E. D. Etnyre & Co., Oregon, Ill., or circle **No. 2-7** on the reply card.



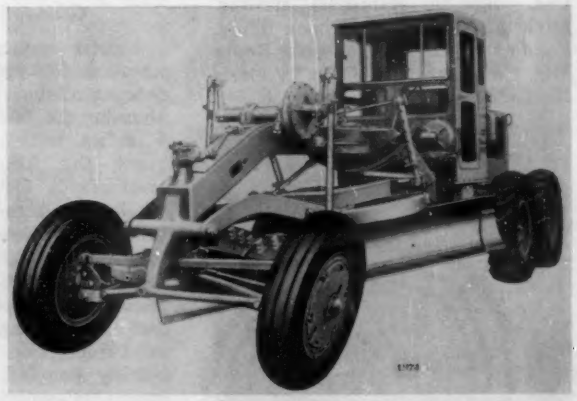
Soil and Asphalt Compactors

Operating on the same principle as the Jay 12 compactor, the Jay 24 is particularly designed for larger areas where maneuverability of a larger machine is possible. Jay 24 blade sizes range from 24 to 36 inches and are easily changed to meet various jobs or soil conditions. Using an air cooled 7 hp Wisconsin engine, the Jay 24 provides twenty-five hundred 3600-pound impact blows per minute and will properly keyseat and compact material to high uniform Procter densities to meet all state and Federal Government specifications. For further information write to Jay Co., 168 Hosack Street, Columbus, Ohio, or circle **No. 2-8** on the reply card.

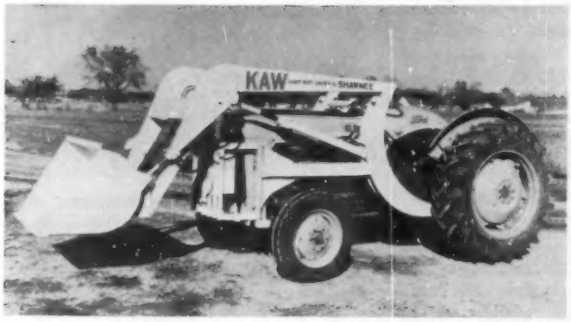
Off-Highway Dump Truck

Autocar 15-ton dump truck with high horsepower to weight ratio and planetary drive rear axle. Dump body has scoop ends; two cylinder hoists give the body a 70° dumping angle. Check **No. 2-9** or write White Motor Co., Cleveland, O.

Cat 115 HP Motor Grader



Cat No. 12 motor grader has the hydraulic shift moldboard for the operator's convenience in grading. Blade angle is automatically maintained by automatic blade control. Write Caterpillar Tractor Co., Peoria, Ill., or circle **No. 2-10**



Loader is used by construction and maintenance departments

Many types of attachments can be used with these tractors

Utility Loader For Ford and Ferguson Tractors

A newly designed utility loader, termed the "Kaw" loader, has been announced by Shawnee Mfg. Co. The loader has a 10-cu. ft. roll-back bucket actuated by twin, 2-in. double-acting cylinders. Lifting cylinders hoist 1250 pounds to a 9-ft. dumping height. Controls are fingertip type located at the right of the steering wheel. The operating cycle for the loader is 5 seconds to full dumping height, 3 seconds to down position. Additional information may be secured from Shawnee Mfg. Co., 1947 North Topeka Avenue, Topeka, Kansas, or circle **No. 2-11** on the reply card.

Cutting Edge For Roper Dozer

A special saw-tooth cutting edge which bites in quickly in hard or frozen ground, has been developed for the Roper dozer. The special edge is patented by the Shunk Mfg. Co., and offered on the Roper dozer blade. It provides quick "dig in" on wild quack grass or similar growth which causes many blades to slide over. The Roper dozer is also available with the regular straight cutting edge, for industrial grading, terracing, ditching and back filling. For further information write Roper Mfg. Co., Zanesville, Ohio, or circle **No. 2-12** on the reply card.

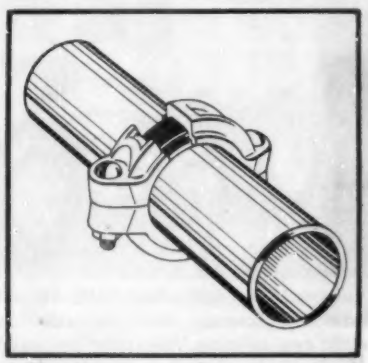
Blade will not slide over quack grass or similar growth with saw-tooth edge

Case-TerraTrac Crawler Tractors

Three engineering advancements of the Case-TerraTrac tractors were demonstrated at a special "preview showing" at the Churubusco, Indiana, works of the J. I. Case Co. The new developments referred to technically as "counter-rotation", "torsion bar suspension" and "centralized lubrication," are incorporated in two new heavy-duty Case-TerraTrac crawlers in the 80 and 100 gross hp class. The counter-rotating feature of TerraTrac's hydraulic transmission, provides complete independent power control of each track—both as to speed and direction. This is achieved by four hydraulic clutches on either side of the center input shaft, thus giving the transmission both high and low speeds, plus forward and reverse on each side. The machine can make a 360-degree spin-turn practically within its own length—with one track driving forward and the other in reverse. The 80 hp Model 800 can make smooth power turns within a 11-ft. track radius. It can also pivot 360 degrees within a track-radius of 7½ feet or spin completely around within a track-radius of only 5 feet 7 inches. Both machines have four speeds forward up to 6 mph plus four reverse speeds to 7 mph. All power clutches used in the terramatic transmission are heavy-duty ventilated oil-cooled type, with sintered metal linings. These larger-capacity units are also equipped with a Borg-Warner torque converter drive. The 80 hp Model 800 develops in excess of 20,000 lbs. of drawbar pull or push, under maximum tractive conditions, whereas the 100 hp Model 1000 produces a maximum pull of 24,000 lbs. These crawlers are available with a complete line of matching equipment, including tractor-shovels; an angling dozer blade that can be angled hydraulically from the operator's seat; and a straight bulldozer that tips fore and aft and also tilts for ditching and crowning. Write J. I. Case Co., Racine, Wisc., or circle **No. 2-13** on the card.

"Alumiron" Couplings For Grooved End Pipe

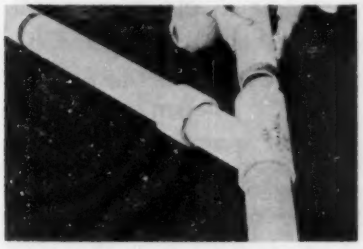
A new economical and flexible coupling for grooved end pipe is now available from Charles E. Manning Co. Stocked in sizes 1 to 8 inches, with other sizes on request, the Alumiron coupling is available in either malleable iron or aluminum and is furnished with Buna N or Neoprene gaskets. For high temperature applications, a special Silicone compound is supplied. For use on steel, aluminum, cast iron, wrought iron and spiral weld pipe, the Alumiron can be quickly coupled or uncoupled by means of two bolts which pass through the coupling halves. A tight seal is easily made by drawing up the two half housings with a socket wrench—this leak tight seal increases as the vacuum or pressure increases up to 1000 pounds. For more information write Charles E. Manning Co., 4700 Clairton Blvd., Pittsburgh 36, Penna., or circle **No. 2-14** on the reply card.



Installation of coupling is very easy

Asbestos-Cement Building Sewer Pipe

A new asbestos-cement building sewer pipe has been announced by Keasbey & Mattison Co. as an addition to its line of asbestos products. Most extensive use of this pipe is expected in short length house-to-street sewer hookups in connecting residence sewage outlets to septic tanks or nearby municipal sewer lines. This pipe will not corrode and may be expected to remain intact under the soil for an indefinite period of time. It is produced in 13-foot sections, and half-length sections; and there is a complete line of asbestos-cement fittings. The pipe is available in 4-in.



and 6-in. diameters. Adjoining sections of pipe are quickly and tightly joined by a specially designed coupling which makes root intrusions into the pipe impossible because of its close fit. For more details write Keasbey & Mattison Co., Ambler, Pa., or circle **No. 2-15** on the reply card.

Continuous Loading Rubbish Truck Body

The new hopper-type garbage and rubbish truck body, announced by Daybrook Hydraulic Division, is designed to permit loading and packing in a continuous, automatic cycle. There is no waiting for the hopper to be emptied. Bigger loads are made possible by an exclusive pre-crushing action which easily compresses large cans, crates and boxes into a small space-saving area. A safety feature is the elimination of gears, chains or any exposed mechanism that could be dangerous to loading personnel. By simple removal of a hinged cover plate, the hydraulic tailgate mechanism may be completely exposed for maintenance and service. The mechanism may be powered either by the truck engine or an auxiliary 14 hp air-cooled engine. The body is manufactured in sizes of 12, 16 and 20 cu. yds. For further information write L. A. Young Spring & Wire Corp., Daybrook Hydraulic Div., Bowling Green, O., or circle **No. 2-16** on the reply card.

Oliver Crawler Tractors

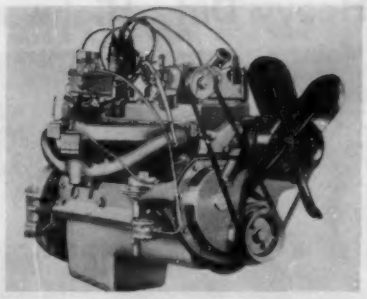
A new line of crawler tractors has been announced by the Oliver Corp. The OC-4 tractor is powered by a 21.8 dbhp gasoline engine and the unit mounts a full range of working attachments, both front and rear. The heavy-duty, easy-shift, 4-speed transmission delivers forward speeds from 1.55 to 5.23 mph with 1.80 mph in reverse, for rapid cycle dozing and loading work. There is also a loader model of the OC-4. This low-mounted loader provides exceptional visibility for the operator because there is no high, view-obstructing pedestal. Roll-back and dump angle are greater and the bucket level is automatically maintained throughout the lifting cycle. The OC-12 with Power-Turn is a medium-size machine that has a double planetary reduction gear system, one for each track. Two of Oliver's largest crawlers, the OC-18, are also included in the new line. One will have cable dozer and the other hydraulic dozer. The big units have Power-Turn with special features for their job range, including the ability of making spot or gradual turns and changing speed and drawbar pull without shifting. Power is supplied by an Oliver diesel engineered to deliver 161 hp

Diesel or gasoline engines furnish power for these tractors of various sizes

with high torque through a wide range of engine speeds. There is a full line of matched attachments. For details write The Oliver Corp., 400 West Madison St., Chicago 6, Ill., or circle **No. 2-17** on the card.

Heavy Duty Jeep 6 Industrial Engine

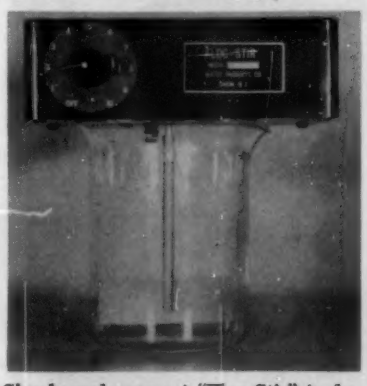
A "Jeep" heavy duty 6-cylinder engine for industrial use has been announced by Willys. The engine is designed specifically to produce high torque at low speeds. Valves of the Jeep 6 are hard faced Stellite or Eatonite material, with Stellite or Eatonite valve inserts and positive rotation for long life. Pistons are of aluminum alloy, each with a control band. Completely new manifolding and single barrel carburetion permit economical operation, and a compression ratio of 6.9 to 1 provides excellent performance with standard grades of fuels. With 226 cubic inches displacement, the engine provides the following horsepower and torque for continuous duty under full load: At 1200 rpm maximum continuous torque is 143; continuous hp 33; at 2600 rpm maximum continuous torque is 132, continuous hp 65. Detailed data may be obtained by writing to Willys Motors, Inc., Industrial Engine Department, Toledo, Ohio, or by circling **No. 2-18** on the reply card.



Six cylinder industrial engines are designed for durability and to produce high torque at minimum speeds

Laboratory Stirrer For Flocculation

The "Floc-Stir" is simple and compact and is designed especially for running jar tests necessary for the operation of clarification equipment operating on the principle of coagulation. It has a variable speed range of from 10 to 60 rpm and is equipped with a plastic paddle suitable for tests run in either 600 ml or liter beakers. The "Floc-Stir" can be supplied either battery or line operated. Its light weight and compactness makes it particularly desirable where a portable stirrer is required for field work. For more information write to Water Products Co., P.O. Box 132, Union, N.J., or circle **No. 2-19** on the reply card.



Simple and compact "Floc-Stir" is designed especially for running jar tests

Heavy Duty Highway Construction Trucks

Eight International truck models specialized for road building work have been announced by International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Included are four and six-wheel models for highway and off-highway service. They range from pickup trucks to heavy-duty dump trucks. Check **No. 2-20** on card.

Faster Horizontal Earth Boring Machines

Boring speeds of the latest Hydrauger horizontal earth boring machines have been increased as much as forty percent. This is a result of re-designing and incorporation of the latest high-torque (high power) Ingersoll-Rand Multivane air motors. This special motor is built to bore and cut through tree roots encountered while boring underground for pipe and conduit installation; and for soil drainage. Water, forced through the hollow steel boring bar sections, cools the cutting bit, washes cuttings from the hole and seals the hole walls. Cool bits allow the Hydrauger operator to gain full advantage of the new air motors; he can crowd the bit into the formation as the lugging ability of these motors maintains speed and full power right up to the stalling point. The straight open hole allows the installation of many kinds of pipe; even asbestos-cement types with O-ring couplings are easily snubbed into place. The larger machines available bore holes of 2 through 24 inches in diameter for distances up to 250 feet. Complete information is available from Hydrauger Corp., Ltd., 681 Market Street, San Francisco 5, Calif., or circle **No. 2-21** on the reply card.

Drott Three-Yard TD-18 "Four-In-One"

The reason behind the unique design of the "Four-In-One", according to Drott, is that the average owner of a shovel-loader frequently needs bulldozing of close-controlled stripping or grading in his operation. Often, the operator tries to get by without attaching a bulldozer blade. You can skid a bigger load than you can carry; you can pry out a bigger chunk than you can lift straight up; you can doze more precisely by blade pitch for depth of cut; and you can load into a higher haul unit or bin by opening the bottom of the bucket. All of these features have been incorporated in the new TD-18 "Four-In-One." This rig, operated hydraulically, can be converted instantly from Skid-Shovel, to bullclam, to clamshell, or to bulldozer by a small lever located within easy reach of the operator. The new unit, when operated as a Skid-Shovel, gives a pry-over-shoe break-out action of 27,000 pounds, plus a 46° ground-level bucket roll-back. It will dump with a clearance of 12 feet, 9 inches. For use as a bulldozer, the 8-foot blade has shoes that ride on the ground, giving a skidding action. In operating as a bullclam, the clam becomes a depth gauge. As the bulldozer is pushed ahead, material boils into it from the bottom in true scraper-like action, and fills to a heaping load with a minimum of stress on the tractor. Opening the bullclam wide makes it possible to operate the "Four-In-One" as a clamshell. For further details write International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill., or circle **No. 2-22** on the reply card.

Light Controls of Advanced Design

A light control, the Lumatrol Model S, is a new unit recently made available by Micro-Balancing. No higher than a pack of long size cigarettes, the control features advanced circuitry which requires no phototube. Instead, a light sensitive cadmium sulfide cell is used, permitting much smaller size and providing greatly extended trouble-free life. The Model S needs no orientation to compass direction because of the omni-directional light sensing characteristics of its weatherproof cover. Installation is made by plugging in to a twist lock socket now incorporated in the luminaires of most manufacturers. For more details write Micro-Balancing, Inc., Garden City Park, N. Y., or circle **No. 2-23** on the reply card.

Light control unit, Lumatrol Model S, plugs into a simple twist lock socket

1956 Public Works Index

The index of articles published in Public Works during 1956 is now available as a separate reprint. It will be sent on request to any reader. It will not be published in any issue, but it will be inserted in bound volumes ordered from us.

Texas Short School Set

The dates for the annual short school sponsored by the Texas Water and Sewage Works Association are March 3 to 8. The site is Texas A & M College, College Station. Information may be obtained from V. M. Ehlers, Director, Division of Sanitary Engineering, Texas State Dept. of Health, Austin, Texas.

Industrial Waste Conferences

The 12th Purdue Industrial Waste Conference will be held May 13, 14, and 15 in the Purdue Memorial Union Building. Information and registration blanks may be obtained from Don E. Bloodgood, Professor of Sanitary Engineering, Purdue University, Lafayette, Indiana.

The Virginia Industrial Wastes and Sewage Works Association will hold its annual meeting at Williamsburg, Va., March 21-22. J. J. Corbalis, Jr., 835 So. Payne St., Alexandria, Va., is President.

NEWS OF ENGINEERS

J. K. G. SILVEY was elected President of the Texas Water and Sanitation Research Foundation at its annual meeting, held November 9th in Austin, Texas. LOUIS KOENIG is the new Vice President and FRANK VON ZUBEN, Secretary. Among papers presented at the meeting was a report on the Foundation - sponsored industrial waste utilization project by C. H. CONNELL, Medical Branch, University of Texas.

PROF. HOWARD M. GIFFT of Cornell University, Ithaca, N. Y., died on Dec. 20. A long-time leader in civil and sanitary engineering teaching, he had just been appointed Dean of the University Faculty.

CHARLES A. HASKINS, head of the consulting engineering firm of Haskins, Riddle and Sharp, Kansas City, Missouri, died on December 28. Mr. Haskins had designed many sewerage systems and treatment plants in the Mid-West and Southwest areas.

CLASSIFIED ADVERTISING AND JOB OPPORTUNITIES

NEW POSITION

CINCINNATI SEWAGE DISPOSAL

Superintendent, Mill Creek Sewage Works:

Salary range, $7830 to $8613 a year. Supervise plant operation of 129 mgd capacity plant, now under construction. Modified primary treatment, separate sludge digestion with sludge disposal. Must have four years experience in sewage plant operation, engineering degree, be able to qualify for Ohio P. E. and Class "A" operator's license. Management ability essential.

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For Further Information and Applications, inquire:

San Francisco Civil Service Commission
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Biologist, mathematician, BS, MS, 27 years old, with research experience in taste and odor problems and in water chemistry seeks suitable employment. Very ambitious, with supervisory ability and capable of meeting the public. Resume upon request.

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City Council
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NOTICE TO BIDDERS

Sealed bids will be received until 11 o'clock A.M., EST February 11, 1957, in the City Commission Room, Fort Lauderdale, Florida for

SECTION I — SIX WELLS AND PUMPING STATIONS

SECTION II — RAW WATER MAINS

SECTION III — WELL FIELD ELECTRICAL DISTRIBUTION AND APPURTENANCES

Bidding blanks may be obtained from the office of the City Engineer. Plans and specifications are on file in the office of the City Engineer.

A deposit of $25.00 for plans and specifications, and of $25.00 each for additional copies of plans or specifications, will be required. All deposits for plans and specifications will be refunded upon their return in good condition within ten (10) days of the opening of bids.

A certified check for 2% of the total amount of the bid, made payable to City of Fort Lauderdale, Florida, shall accompany each proposal as evidence of good faith and responsibility of the bidder. This check shall be retained by the payee as liquidated damages should the bidder refuse or fail to enter into a contract with the payee for the execution of the work embraced in the proposal, in the event the proposal of the bidder is accepted.

The City reserves the right to reject any or all bids.

W. J. Veeder, City Manager

meters both at the curb and on obtain maximum efficiency and

INDEX OF ADVERTISEMENTS

FOR TIGHTER, FASTER

BOOKS IN BRIEF

AMERICAN CIVIL ENGINEERING PRACTICE

These two volumes prepared by a staff of Specialists under the Editorship of Robert W. Abbett, Partner, Tippetts - Abbett - McCarthy - Stratton, Engineers, New York, are very good references for practicing civil engineers. Volume I covers metropolitan and community planning; surveying; traffic, highway, airport and railroad engineering; soil mechanics and site examination; foundations; earthwork and dredging; tunnels and mathematical tables. Volume II contains hydraulics and pumping; hydrology; dams; river engineering; hydroelectric power; irrigation and land drainage; public water supply; sewerage and sewage disposal; refuse collection and disposal; and harbor engineering. The publishers are John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. The cost is $15 per volume.

SYMPOSIUM ON IMPACT TESTING

This symposium tries to fulfill the larger needs of this area of testing by including papers discussing impact and shock tests for parts, components and complete structures. Five additional papers considered timely and appropriate to the subject are included. Such innovations as the impact tube are discussed and environmental conditions, particularly temperature, are considered. The book which contains many graphs, charts and photographs, also contains several bibliographies. Copies may be obtained from the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa., for $3.50 each.

PARKING GUIDE FOR CITIES

The Bureau of Public Roads has published an illustrated, 172-page bulletin which analyzes the elements of the parking problem and indicates practical solutions. It describes various types of parking studies and presents statistical information on parking and travel habits in central business districts. One chapter deals with the steps taken by private enterprise, commercial operators, and public authorities in cities. Subsequent chapters deal with administration, land acquisition, public financing, legal aspects, and the use of parking meters, both at the curb and on parking lots. The final chapter of the book offers information on the location and design of parking facilities. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 55¢.

TIMBER DESIGN AND CONSTRUCTION HANDBOOK

This book is organized into three main sections. The first section covers the fundamental structure and characteristics of wood: its types, grades, and ways of preservation. This enables the designer to obtain maximum efficiency and economy from his material. The second section explores and analyzes preliminary considerations, general design procedure, design details, fabrication and erection. The third section provides design and engineering specifications and tabular data in simplified form, allowing easy conversion for particular grades and species. This gives a concise tabular reference to fit combinations of grade, span and loading. This book was prepared by Timber Engineering Co. Publishers are F. W. Dodge Corp., New York. Price per copy is $12.75.

WORTH TELLING

by Arthur K. Akers

Mr. Ellis

★ RODERICK ELLIS, latest addition to PUBLIC WORKS' advertising sales staff, will assist Mid-West Sales Manager Robert J. Shea in the Chicago office. Rod's experience-record almost totals more years than his age, but what that adds up to is that he knows his business.

★ HAPGOOD KIPP is appointed Philadelphia district manager, Simplex Valve and Meter Co. He was formerly with Belco Corporation, after seven years with American Water Softener Co.

★ PAUL J. McMAHON is elected president, McMahon Brothers, spraying service distributors and contractors, Binghamton, N. Y.

★ THE ONLY BOOKS we review here are those edited by Nathaniel Pousette-Dart, PUBLIC WORKS' own art director. His latest, "American Painting Today", is just out, with 155 selections by 14 museum art directors. Even we understand part of the book, and admire all of it!

★ D. W. HUTCHESON CO., Boston 16, now represents The Bennett Mfg. Co., waste receptacles, of Alden, N.Y., in all New England. "Litterbugs" take notice!

★ W. O. BEEMAN is new sales manager, Danco Industrial and Agricultural Division of Danuser Machine Works, Inc., Tulsa, Okla.

★ JAMES B. COOK, Jr., goes to Hays Mfg. Co., Erie, Pa., as division sales manager. Jim will be best remembered for his long connection with % Proportioneers Inc.%, Providence, R. I.

★ D. J. REDMOND is appointed director of sales, Hercules Galion Products Inc.

★ DORR-OLIVER Inc., opens a new office, in Baltimore, with Sales Engineers Kelsey C. Lindstrom and Benjamin F. Rockecharlie in charge.

★ FRANK G. HOUGH CO. names Robert D. Schwartz assistant advertising manager, Robert L. Knox and Herman R. Brown, assistant sales managers.

★ KOPPERS TAR PRODUCTS Division, promotes B. Otto Wheeley from Southern district manager at Birmingham to Assistant Sales Manager, Pittsburgh headquarters. John Hancock succeeds Mr. Wheeley in Birmingham.

★ DRESSER MFG. Division, Bradford, Pa., names M. C. Cleland as General Markets Sales Representative, to cover Texas, Oklahoma and Arkansas. He was formerly director of procurement, the Universal Corporation.

★ HOMER nodded often, and even we do occasionally. So change the year of the Inter-American Congress of Sanitary Engineering mentioned by us last month to 1958.

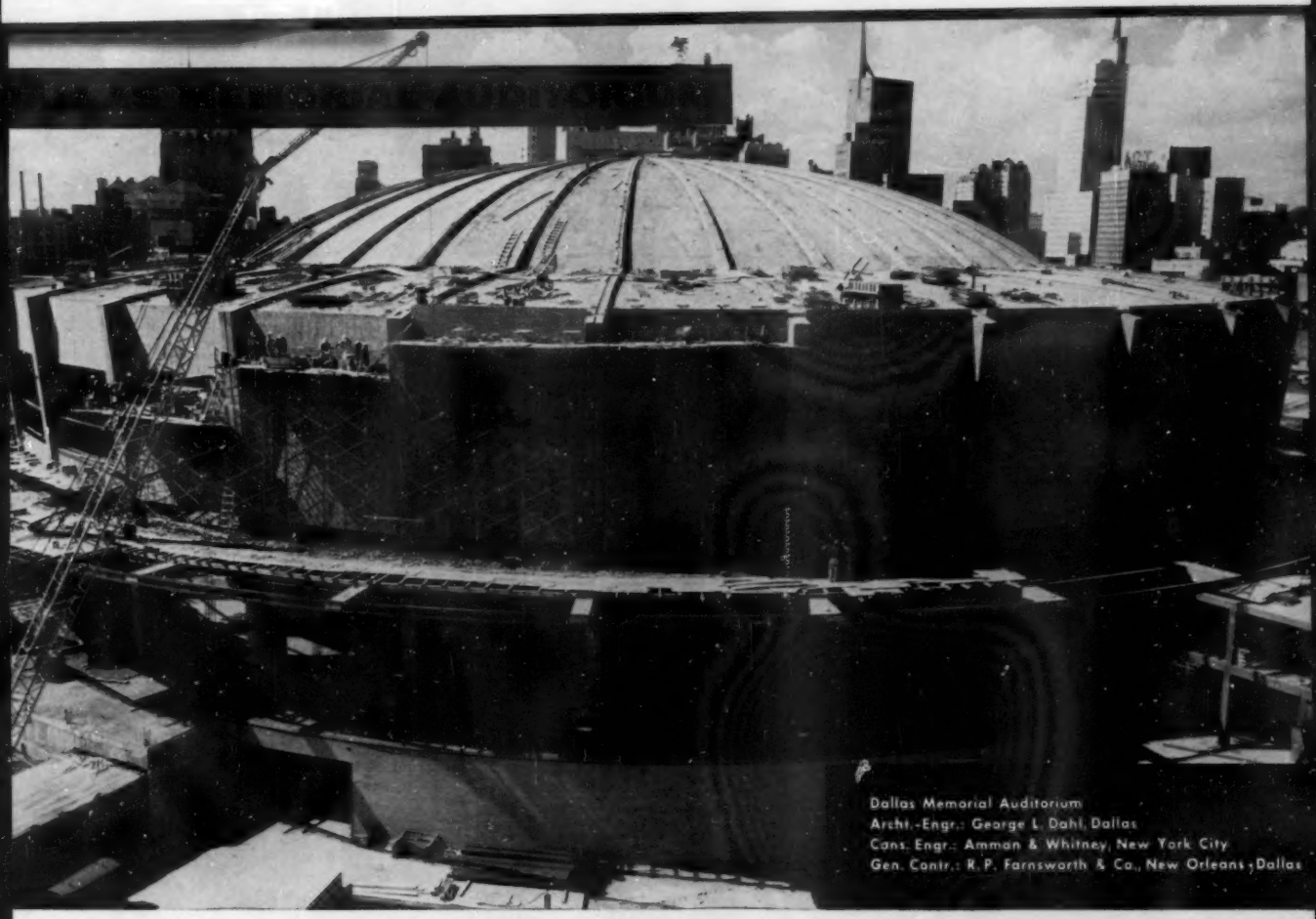
★ DANIEL S. HEFFRON is elected vice-president of the "Quick-Way" Truck Shovel Co., Denver. He has been sales director of the company since 1944.

Mr. Heffron

Mr. Smith

★ W. HARRY SMITH joins the Cast Iron Pipe Research Association's Chicago staff following eight years with the Illinois Department of Public Health and Illinois Sanitary Water Board.

★ PARK Commissioner Bob Moses of New York tells of a handsome tomcat who was taken to the veterinarian, to return somewhat subdued. After that, Mr. Moses reports, he only went out two or three nights a week, in a consultant capacity.



Dallas Memorial Auditorium
Archt.-Engr.: George L. Dahl, Dallas
Cons. Engr.: Amman & Whitney, New York City
Gen. Contr.: R. P. Farnsworth & Co., New Orleans-Dallas

how architects employed POZZOLITH to get desired concrete results

ARCHITECTS and ENGINEERS employ POZZOLITH with confidence

★ *proved performance*...130 million cubic yards of concrete produced with Pozzolith for all types of jobs.

★ *applied know-how*...more than 85 skilled Master Builders' field technical men for product-use consultation.

★ *available everywhere*...over 1000 ready-mix and job-site plants now producing concrete with Pozzolith.

Concrete with lowest possible unit water content and good workability was specified in the construction of this $8,000,000 Dallas Memorial Auditorium.

A prime requirement was control of rate of hardening under summer and winter job conditions to provide uniform workability and uniformly high 48-hour strength for the lightweight concrete of the dome.

These requirements were met with Pozzolith. Pozzolith with its adaptations is key to the control of:

1. *water content*...makes possible lowest unit water content for a given workability.
2. *entrained air*...provides optimum air content without sacrificing other desired qualities.
3. *rate of hardening*...gives desired handling and finishing time under widely varying job conditions.

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COLORED MOTION PICTURE, "The Man with The Trowel", shows how Pozzolith greatly improves your control of concrete quality. Film available for private showing to groups of any size.

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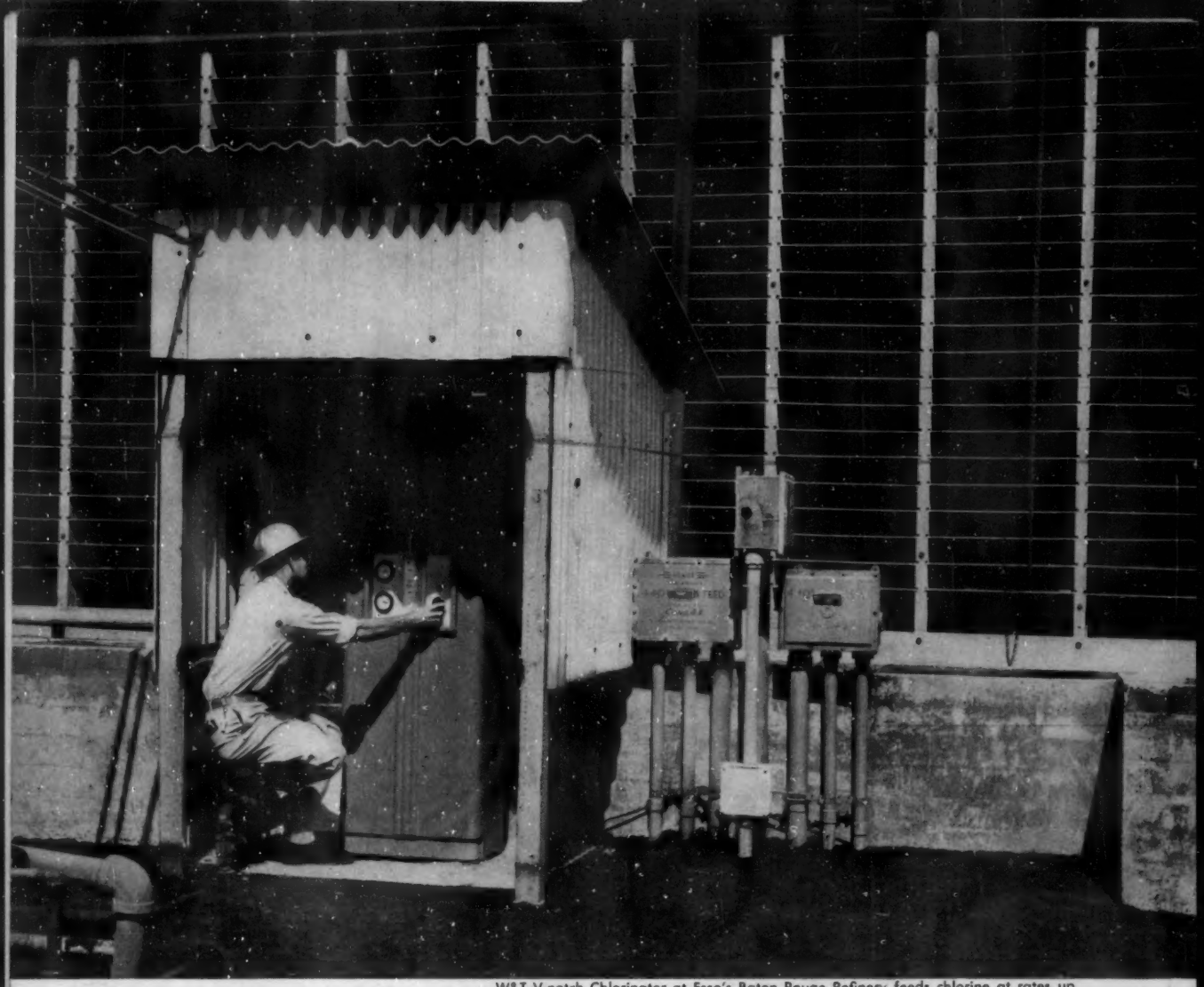

W&T V-notch Chlorinator at Esso's Baton Rouge Refinery feeds chlorine at rates up to 500 lbs./24 hr. over a 10 to 1 feed range. Other V-notch models are available with maximum capacities from 500 to 2000 lbs./24 hr. over a 20 to 1 feed range.

NEW W&T V-NOTCH CHLORINATORS

are rugged–easy to operate–moderately priced.

The W&T V-notch Chlorinator installed at the Esso Standard Oil Co. Refinery, Baton Rouge, La. is housed in a shed open to the sun, weather, and water spray drifting from a cooling tower. The average water or sewage treatment plant operator would consider this rugged service for any piece of equipment.

W&T V-notch Chlorinators have proven in this and other installations that they can withstand rugged service. The design of new V-notch Chlorinators uses not only modern corrosion proof materials but a new concept of chlorine gas control, the W&T V-notch Variable Orifice. V-notch Chlorinators are easy to operate and maintain. They provide the precise chlorine control that is expected from Wallace and Tiernan equipment. In addition, W&T V-notch Chlorinators are an attractive piece of equipment, colored soft green to fit into plant color schemes.

Ask your local W&T representative for more information about W&T V-notch Chlorinators or send for Bulletin S-113.

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